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◆

"Neither shall there be any more pain."

A PRACTICAL TREATISE

ON THE

DISEASES OF CHILDREN.

26-A-35-3

A PRACTICAL TREATISE

ON THE

DISEASES OF CHILDREN.

BY

J. FORSYTH MEIGS, M.D.,

FELLOW OF THE COLLEGE OF PHYSICIANS OF PHILADELPHIA; MEMBER OF THE AMERICAN
PHILOSOPHICAL SOCIETY, AND OF THE ACADEMY OF NATURAL
SCIENCES OF PHILADELPHIA.

Third Edition,

CAREFULLY REVISED.

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PROFESSOR OF THE PRACTICE OF MEDICINE

IN THE UNIVERSITY OF PENNSYLVANIA,

ONE OF THE PHYSICIANS OF THE PENNSYLVANIA HOSPITAL, ETC., ETC.,

This Work

IS DEDICATED AS A TRIBUTE OF RESPECT

FOR HIS HIGH PROFESSIONAL ATTAINMENTS

AND EMINENT PRIVATE VIRTUES,

AND AS A MARK OF GRATITUDE FOR HIS VALUABLE INSTRUCTIONS,

BY HIS FORMER PUPIL,

J. FORSYTH MEIGS.

PREFACE

TO THE SECOND EDITION.

The first edition of this work formed one of a series entitled "The Medical Practitioner's and Student's Library." For reasons which it is unnecessary to relate in this place, it has been withdrawn from that series, and now appears as a distinct and separate publication.

The author owes an apology to some who have been waiting for the second edition of this work, for its non-appearance at the time when the first was exhausted, now nine months since. His excuse is, simply, excessive occupation in private practice, the demands of which have been so urgent as to leave him but scanty time for attention to other matters.

The motives which induced the author of this work to undertake its preparation were (as stated in the preface to the first edition), the hope that the details of his own experience might prove of some utility, and the belief that a work on the diseases of children, executed upon a somewhat different plan from those already before the profession, might not be an unacceptable addition to the medical literature of the country. The writer has, in fact, aimed to make this work more methodical and precise than those heretofore published in this country. He has, in narrating what he has himself observed, endeavored to do this with the greatest possible accuracy; and, where the subject has concerned one susceptible of numerical demonstration, he has, in most instances, employed that method of statement, in order to enable the reader to draw his own conclusions. Whatever may be the advantages or disadvantages of the numerical method in medicine, it must certainly give much greater accuracy and precision to medical observation than the method usually followed by the older writers, who merely stated their own generalizations (often, no doubt, loosely and carelessly drawn), instead of giving to the reader the facts upon which those generalizations were founded, and thus allowing him to judge for himself of their probable truth and correctness.

The classification of diseases according to the systems which they affect, has been adopted as the most convenient. The divisions of each article are, with a few exceptions, those employed by the most eminent among recent systematic writers. In the composition of the work, the author has availed himself as fully as possible of the best foreign and domestic authorities on the diseases of children within his reach—always, however, endeavoring to judge what came under his notice by the knowledge derived from his personal experience in private practice. In this way he hopes that he has been able to select from the labors of others whatever is most important to be known in the present state of medical science, and to reject what seemed fallacious or useless. In order to show upon what basis his right of personal judgment rests, he may state that this work now contains the results obtained from a careful record, and, in very numerous instances, a daily observation, of 1180 cases that have occurred in his own private practice.

The principal changes and additions that have been made in the present edition are the following: An introductory essay of over thirty pages, upon the clinical examination of children, has been inserted, the author believing this to be a subject that might be treated of with advantage to many who have not paid that separate and distinct attention to the diseases of children which they demand and require. The articles on croup, bronchitis, and pneumonia, have been entirely re-arranged, and in many parts re-written; and the results obtained from the observation of a large number of additional cases have been made use of. The subject of tracheotomy in croup has been discussed at considerable length. A very full article on atelectasis pulmonum, or imperfect expansion of the lungs, has been added, and the new doctrines in regard to atelectasis have been applied in the articles on bronchitis and pneumonia. The article on scarlet fever has been almost re-written, and the results of a little over one hundred new cases have been added to those contained in the first edition. This subject has, indeed, been very fully treated of; for the disease has been so rife and so fatal in this country of latter years, as to give it much greater importance than formerly.

A mode of classification of the disease, different from that in general use, and one that renders it, the author thinks, more readily understood, has been employed. The article on measles has also been very much added to. Lastly, there will be found somewhat over a hundred pages of new matter on the diseases of the skin. In the consideration of these latter affections, the author has endeavored to be full and thorough, without being diffuse or prolix.

To conclude, the author has merely to say to any who may chance to inquire why he has not furnished articles on some subjects untouched upon in the present volume, that the reason is solely the want of time and opportunity to make use of the materials he has collected. Should the work have the good fortune to pass into another edition, he hopes and expects to fill up the omissions of the present one.

PHILADELPHIA, May, 1853.

PREFACE

TO THE THIRD EDITION.

THE author has nothing to add to the statements made in the preface to the second edition of this work, except that this, like the former edition, has been carefully revised, and that the experience he has obtained in the interval between the two publications, and a considerable number of cases, have been incorporated into the text. He has to regret that circumstances over which he has had no control have prevented him from adding, as he had proposed, chapters on various subjects not touched upon.

The author takes this occasion to offer his sincere thanks to the profession for the kind manner in which his work has been received.

PHILADELPHIA, November, 1857.

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A
PRACTICAL TREATISE
ON THE
DISEASES OF CHILDREN.

INTRODUCTORY ESSAY.

ON THE CLINICAL EXAMINATION OF CHILDREN.

THE clinical examination of children, and particularly of young infants, cannot be successfully practised upon the same method as that habitually made use of in the case of adults. The truth of this statement will be readily assented to by all who have had much experience in the treatment of the diseases of the two ages, by those who will reflect for a moment on the great differences in the expressions of the various organs in early and adult life, and by those who are acquainted with the opinions of distinguished writers upon children's diseases. It is proper and useful, therefore, to preface a practical work on the diseases of children, with a sketch or plan of the best method to be pursued in forming a diagnosis of these diseases, and with remarks upon the physiological characters which distinguish the organization of early life from that of maturity.

The difficulties that beset the path of the practitioner in his clinical examination of children are so great that he who has not been prepared by preliminary study to surmount these obstacles, will find it a most uncertain and dubious task to unravel the history and nature of any case that may be set before him. The helpless silence of the infant,—the wilful silence, or the loose and inconsistent answers of the older child, which lead astray the mind rather than guide it to true results,—the agitation and fright produced by the examination, rendering it impossible at times to ascertain the real state of the different functions of the economy,—and, lastly, the difficulty of obtaining accurate and reliable accounts from the attendants of the history of the case, all combine to make the duty of the physician most perplexing, and, unless he be gifted with a large share of patient and philosophic calmness, most irksome and trying to the temper. So great, indeed, are the difficulties encountered by some practitioners who enter upon this branch of the practice of medicine without proper preliminary preparation, that they never overcome them; but, to use the words of Dr. West, "grow satisfied with their ignorance, and will then, with the greatest gravity, assure you that the attempt to understand these affections is useless." That it is possible, however, to overcome, in great measure, these obstacles, and to arrive at a correct diagnosis in nearly all cases, is quite as true as that these obstacles really exist. But, in order to do this, the physician must first be aware that difficulties exist, and must have formed in his mind some plan or method by which to surmount or elude them.

Before proceeding to show what is the best method of examining or exploring disease in children, I must state that my remarks apply chiefly to infants and very young subjects; for, after the age of eight and ten years, the physical and intellectual development have progressed to such a point as to render the method of diagnosis nearly the same as that employed in adults.

The chief causes which render the diagnosis of disease in young children difficult, are the absence of the faculty of speech, and the violent agitation generally caused by the examination, which prevents a proper appreciation of the state of certain organs and functions.

It is easy to understand how much our means of diagnosis are restricted by the absence of the faculty of speech. How many symptoms are there in the case of adults with which we become acquainted only through the patient's own account of his sensations; and, consequently, of how many must we be deprived in children by the absence of this account! It might, indeed, at first view, seem impossible to detect the nature of the sickness without the assistance of this means, so greatly do we depend upon it in our examinations of adults. Nevertheless, we shall find ourselves enabled, by an attentive consideration of other resources in the child, by a close study of its physiognomical expression, its decubitus, the nature of its cry, and by the most rigidly careful physical examination, to form our conclusions with almost as great a degree of precision as in older patients.

The other causes of difficulty,—the violent disturbance, both physical and moral, of the child, its fright, agitation, and cries,—constitute, when they are present in a high degree, much greater embarrassments than the want of speech. To overcome these, the physician must use all his skill, tact, and patience; for, unless they can be avoided by art, or overcome by soothing and gentle persuasion, he can learn but little that will be of essential service to him in making up his opinion. He can neither read the countenance of the little patient, nor judge by its attitudes or decubitus of the state of the various organs, whether internal or external; he will be unable to ascertain the rate, force, or regularity of the circulatory or respiratory functions; he cannot, to any useful purpose, examine the abdomen, to learn whether it be tender on pressure, or whether its contained organs be in their natural condition as to size and position; and, lastly, he will find that the physical exploration of the lungs and heart, by auscultation and percussion, yield him at best only imperfect results.

To avoid the difficulties just detailed, it is always useful, if not absolutely necessary, to conduct certain portions of the examination whilst the child is calm and quiet, and certain others whilst it is disturbed and agitated. This distinction of the examination into two periods, or stages, is one of the utmost importance in a practical point of view, and should never be forgotten by the physician during his clinical observation of the various symptoms the patient may present.

By the period of calm is meant a condition of total quiescence, in which the child is undisturbed either by internal or external causes of irritation. This condition is best found in the state of sleep. If this cannot be obtained, the one most nearly approaching to it is that which exists during the act of nursing, or which follows that act. The luxurious ease that follows a full meal, almost always causes the infant to fall into a gentle and languid slumber, during which it will allow a careful examination upon many points without agitation. If possible, therefore, the physician should always see the child when asleep, and if the mother or nurse propose, on the occasion of his visit, to hurry up stairs to prepare the child, or to bring it down into the parlor or lower room, he should ask, as a favor, that he may see it if possible asleep.

If, in spite of having just been nursed, the child be awake and fretting, and when, also, it is more advanced in age, we should endeavor, by the attraction of toys, by gentle and soothing words and manners, by fondling, or by having it carried about the room, to get it quiet.

Before proceeding to a consideration of the particular means by which we are to judge of the state of health or sickness of young subjects, it is proper to call attention to the great importance of a careful examination of the attendants, in regard to the history of the case, previous to and between the medical visits. In the instance of children, their inability to describe their own symptoms compels us to depend entirely upon the mother or nurse for all detail of the case previous to our first visit, and for all accounts of what may have happened between two subsequent ones. It is, therefore, extremely important that this part of the examination should be conducted with every care and caution. Very much that is useful may be learned from it, if it be well managed. A great deal of skill and art are required in putting the questions, and in sifting the evidence thus collected. We should always bear in mind the character of the persons questioned. Much depends upon their education, and much more on their natural powers of observation, and manner of relating what they may have seen. The degree of credence to be attached to their answers must rest upon their probable intelligence. Nurses and mothers will often give accounts of their charges which must be received with large allowance, and even in some few instances with disbelief. I would, however, in this place, most earnestly caution the young practitioner of medicine to be very careful not to misbelieve, or even mistrust, without well-poised reasons, the account of a sick child given by a mother; for though a foolish, weak woman will often give a false or exaggerated statement of the symptoms of her child, an observant and intelligent, and sometimes a foolish and weak one, when guided by maternal instinct, will detect variations from the healthful condition of a child, which may entirely escape the search of the most acute and rigorous medical observer. A mother may perceive a change in the expression of the face, in the manner of the muscular movements, in the temper or conduct of her child, which shall fail to attract the attention of the practitioner; or it may be that the symptom which has caused the parent to take alarm occurs only during the absence of the physician. The medical attendant ought, for these reasons, to listen patiently and kindly to whatever the mother or nurse may have to say, and if unable to detect immediately what they assert they have seen, let him not determine at once that there has been a mistake, that their anxiety has deceived them; but let him examine the patient yet again, and more carefully, or let him pay another visit to learn whether the symptom or symptoms continue, or have occurred again. My own rule, in a doubtful case, is to listen with religious attention to the mother, and unless she be far beneath the average of human intelligence, my opinion as to the fact of some deviation from the ordinary health of the child is considerably influenced by what she tells me.

The inquiry in regard to the history of the case, previous to the first visit of the physician, should bear particularly upon the causes of the sickness, its precise moment and mode of attack, and its course and symptoms up to the present time. The most important points to be considered in connection with these objects, are the health of the parents, including their ordinary health, or their habitual diseases, and the causes and periods of their death, if they are not living; and the state of health of the child at the moment of birth and since. The hygienic conditions in which the patient has been placed ought always to be investigated: the place of habitation; the kind of house, and whether a large well-ventilated room or a small, narrow, and close one; the clothing; the food; and lastly, whether the infant has been suckled, or brought up on artificial diet. The state of the health just anterior to the attack ought always to be examined into. Has it been good and strong, or feeble and delicate? If delicate, what diseases? If the approach of any of the eruptive fevers be suspected from the character of the symptoms, the question as to whether the child has previously had measles or scarlet fever, or has been vaccinated or had variola, should always be asked.

It is next necessary to fix as accurately as possible, the precise period of the onset of the sickness. If the question, "When was the child taken sick?" be asked, as it usually is, the answer will be, "Oh, several days ago," or, "I don't recollect exactly—I think yesterday, or the day before," or some such loose answer. The best way to learn the exact period in a recent case, is to go back, day by day, or else to inquire as to some particular day. We may ask, was the child quite well day before yesterday; was it well last Sunday? did it play and amuse itself? was it as gay and good-tempered as usual yesterday, or the day before, or the day before that? Did it sleep well night before last, or the night before that? A sick child never scarcely sleeps well at night, and very often we may learn, by close inquiry into this particular, the exact time at which the attack began. In this way, by forcing the attendant to tax her memory, and to go minutely over the events of the several days previous, we shall nearly always succeed in fixing very precisely the moment of onset.

Having determined these points, we should proceed to inquire in regard to the course of the disease prior to the first visit. This is to be done only by patient and repeated questioning. The questions must be so framed as to elicit free and unbiassed answers. They should be general, and not leading. Lastly, we are to inquire into the treatment of the case up to the present time.

It is best that all these interrogatories should be made previous to seeing the child, in some other room than the nursery, in order to avoid the risk of alarming the child by the presence, during an unnecessary length of time, of a stranger. If, however, the child be well acquainted with the physician, it matters not where the inquiries are made.

Having now obtained from the attendants all the information they can give in regard to the history and nature of the case, the physician must proceed to the personal examination of the patient, in order to determine, by his own observation, the exact nature of the sickness, and the treatment it may require.

The most important points to be attended to during the clinical examination, are the countenance or facies, noting its expression, coloration, the presence or absence of furrows and wrinkles from pain, from emaciation, or from disordered muscular action, the appearances presented by the nasal orifices, and especially by the alæ nasi, and the characters exhibited by the mouth; the sleep; the cry; the state of embonpoint or emaciation; the condition of the skin as to coloration, temperature, moisture or dryness, the presence of swellings of any kind, such as those produced by dropsy or by affections of the joints, and the existence of eruptions; the pulse; impulse of the heart; the respiration; the signs furnished by the state of the mouth and throat, and by the disposition towards and power of sucking, or by the manner in which drinks are taken; and lastly, the state of the abdomen.

THE COUNTENANCE.—The countenance of a young and healthy infant, who is sleeping or perfectly quiet, wears no expression except that of comfort and content. It is composed and still; no movement disturbs its innocent tranquillity, unless, perhaps, some gentle smile light it up from time to time, when we might well believe the happy superstition of the fond mother, who will tell us that angels are whispering it. In sickness, even when slight, the countenance soon loses this expressionless character. In all acute disorders the alteration is very great, such indeed as to strike the most careless and inexperienced observer. The features become contracted, furrows and wrinkles appear about the forehead, the nostrils are dilated, or pinched and thin, and the mouth becomes drawn and rigid. The extent of the change is generally in proportion to the severity of the attack. The part of the face most altered will depend very much upon the particular system of organs implicated in the disease.

Some authors have endeavored to show that different diseases give to the physiognomy certain peculiar and characteristic *expressions*. This is true only to a certain extent. Thus, the facies is very different in abdominal from that observed in thoracic or cerebral diseases; but though it is *generally* easy for a practised physician to distinguish by the facies alone between a cerebral and a thoracic disorder, it is quite impossible for him to distinguish between any two cerebral, thoracic, or abdominal affections. The particular changes impressed upon the face by different diseases cannot, however, be discussed in this place, but must be considered in the separate articles upon each disease. Here, it can only be stated in general terms, that, in diseases of the brain, the upper part of the face, the forehead, and the eyes are chiefly affected; that in diseases of the thoracic organs, the middle portion of the face, and especially the nostrils, while in those of the digestive organs, the lower part of the face, the mouth and lips, are the parts which undergo the greatest changes in their expression.

Pain may almost always be detected by the expression of the face. It gives to the countenance various shades of expression, according to its degree of severity, and its permanency or recurrence at intervals. Pain in the head is said, by Dr. M. Hall, to produce a contracted brow, pain in the belly to occasion an elevation in the upper lip, whilst pain in the chest is chiefly denoted by sharpness of the nostrils. I doubt, however, whether pain in any particular organ imparts an expression to one part of the face rather than to another, for indeed pain in any part of the body, whether the head, chest, abdomen, or limbs, gives rise to a contraction of all the features. Not one part of the face alone, but the forehead, mouth, nose, and the whole face become changed in expression and contracted, when there is severe pain in any part of the body, so that I deem it impossible from the expression alone to determine where the painful sensation may be seated. The countenance merely tells us there is pain, but not where it is located. The painful expression will be permanent or occasional as the pain itself is constant or only paroxysmal.

The *coloration* of the face becomes often an important means of diagnosis. In all the fevers, phlegmasiæ, and diseases of general excitement, the face will be more or less suffused and red, unless the attack be so severe as to occasion a violent shock to the nervous system, in which event the countenance instead of being suffused, is paler than natural. In such cases the face becomes of a dead white, all traces of red disappear, and the skin at the same time has often a slightly shining or varnished appearance. I have not unfrequently observed this symptom in pneumonia and bronchitis, and also in the latter stages of true croup. It is a very striking phenomenon, and one which usually portends great danger.

In chronic cases of all kinds in which the hematosic and nutritive functions are enfeebled, the face assumes a pallid and waxen hue, which is very characteristic. In the various digestive ailments it becomes icterode or sallow, and in affections of the liver more or less yellow. Lastly, in certain diseases and malformations of the heart or lungs, it becomes bluish or livid, constituting one of the most important signs of what is called morbus cœruleus, blue disease, or cyanosis.

In reading the countenance of a sick child, the practitioner should always notice the play of the nostrils, since this reveals, to a certain extent, the state of the lungs. In pneumonia, bronchitis, and pleurisy, the movements of the alæ nasi become rapid and energetic, expressing, by the degree of their violence and extent, the amount of embarrassment under which the respiratory function is laboring.

The nostrils and nasal passages should always be examined also to ascertain the presence of mucous or purulent secretions, or of pseudo-membranous deposits, since these fluids or their inspissated products, interfere more or less with the free passage of air through those canals.

OF THE SLEEP.—Much useful information as to the state of health of infants and children may be obtained from a careful consideration of the various phenomena connected with their sleep. Of this I am fully convinced from somewhat long and patient observation. We cannot ascertain, indeed, the nature of the disease under which the child may be laboring, but we can detect, with very great certainty, the existence of a deviation from health. I know of few more certain means of fixing the period at which any attack of illness may have begun, than by inquiring at what time the child began to have restless or broken sleep, or insomnia.

A perfectly healthy infant, within the month, who is suckled at an abundant and wholesome breast, will usually sleep twenty out of the twenty-four hours, waking to nurse every two or three hours during the day, and twice or three times during the period of darkness. After the age of two or three months, the child is much more wakeful during the day, though it will still take a nap of two or three hours in the morning, and a shorter one in the afternoon, while it will sleep from early evening until the following morning, waking but once or twice to suck. Indeed, many perfectly healthy infants, of between three and six or seven months of age, sleep without waking from nine or ten o'clock in the evening, until six the next morning. After the latter age, the sleep is seldom so unbroken; the child begins to undergo the first considerable trial to its health, dentition, and it is rendered thereby more or less ailing and irritable, and consequently restless and troublesome at night.

Children who have passed through the epoch of dentition, and who are *perfectly well*, usually go to sleep soon after being put to bed, and never wake again until the following morning. Not only so, but they sleep soundly and quietly, without being disturbed by slight sounds, and without tossing or turning much in their sleep.

In healthful sleep the whole appearance of the child, its expression of countenance, its attitude, and its breathing, are full of the most perfect and beautiful ease and tranquillity. Nothing can be more suggestive of the comfort and well-being that naturally attend upon health, than the perfect composure and graceful postures exhibited by a hearty child during profound sleep.

It needs, however, but a slight disturbance of the health of a child to break in upon its ordinarily calm and peaceful sleep, and to render this restless, fitful, and interrupted by startings, cries, or dreams, or insufficient. The most trifling irritations, as the pressure of a tooth against the gum, the presence in the digestive canal of a little imperfectly digested food, or of one, two, or three lumbricoides, or the slightest fever from any cause, are sufficient to produce this effect, and hence it is that the character of the sleep will often become to a watchful practitioner the first sign of disorder held out by nature.

The degree of disturbance of this function will vary with the nature and severity of the disturbing cause. When slight, the child will continue to sleep throughout the ordinary period, but the sleep will be somewhat uneasy. The countenance will be disturbed. There will be contractions of the brow, and momentary workings of the features will express the perception of some unhealthful sensation. Often the child will toss and turn, and change its position more frequently than natural. Sometimes it will cry out, and appear distressed by some dream or painful sensation. When the cause of disturbance is more serious, the sleep is more broken, the child wakes often, and lies awake for a longer or shorter time, and it becomes very difficult to lull it to sleep again. Or it has painful dreams or nightmare, causing it to scream and struggle in sleep, and then to wake in the most violent affright. In severe instances it becomes almost sleepless. I have very often known teething children not to sleep more than half as much as in health, and to wear out, by the long continuance of this sleeplessness, the patience and even the health of their attendants. In some instances they will no longer sleep in the bed or crib, and the nurse is obliged to get up and walk with them, or soothe them by the movement of a rocking-chair or cradle. In other cases, the derangement of the health is shown by grinding of the teeth, and by the most violent tossing and tumbling about the bed. I have frequently seen a child lying with its head where its feet should be, or across the bed, and with all the coverings thrown off, in spite of the most careful arrangement of the bed-clothes.

These various disturbances are therefore signs of some alteration in the health of the child. They do not lead to an appreciation of the precise nature of that alteration, but they are invaluable as affording indications of the existence of some morbid condition of the economy. Very often, as above stated, they are the first symptoms of the approach of some more or less serious sickness, and as such will often enable us to determine, with much precision, the moment of onset of the attack.

THE CRY.—Crying is one of the modes of expression of the child. Indeed, this, with the expression of the face, are, according to M. Billard, the only means of expression with which nature has endowed the young infant. This is, however, scarcely correct, since we may also class amongst its means of expression the various spontaneous muscular movements indicative of uneasiness, or of pain, or pleasure; the manner in which it drinks or sucks, whether eagerly and with appetite, or languidly, or carelessly, or not at all; the enjoyment it receives from pleasant sounds; and the evident delight it takes in regarding the light. Nevertheless, the cry and the expression of the countenance are the two means on which the physician must chiefly rely for early information of the occurrence of sickness in the young infant. These are the trusty sentinels of nature. By them she first gives notice of the approach of danger, and then measures the amount of mischief that may have been done.

The cry which a child utters during sleep, or even when awake, and when nothing has been done to excite or disturb it, is always indicative of some uneasiness. If the cry be caused by pain, or by any considerable disturbance, it will be accompanied by certain contractions of the features and movements of the body and limbs, which will still more strikingly show that the pain, or other exciting cause, is of a serious nature. Violent and obstinate crying is almost always caused by severe pain,—such as the pain of earache. Indeed, obstinate and long-continued crying, lasting for hours, is rarely met with except from one of two causes, earache or hunger. The cry of earache is often incessant and unappeasable, the pain being generally constant, and not paroxysmal, as are most other pains. It is to be silenced only by the application of remedies to the ear, or by the internal administration of opiates. I have known an infant, three months old, to scream with earache for two days and nights, with only short lulls of a few hours when brought under the influence of large doses of laudanum. As soon as the ear began to discharge, the cry ceased. I am constantly called to see infants and young children who have been crying most violently for hours, and who are thought to have colic, or to have hurt themselves, but who are, in fact, tortured with that most violent of all pains, earache. I have met with few instances in which such severe and *constant* crying has depended on other causes; for, though children scream violently and obstinately from hunger and thirst, they may always be quieted by the supply of either want, whilst in earache the infant generally refuses the breast, or takes it only for a few instants, and then lets go to resume his almost automatic scream.

In not a few instances I have known infants to cry very often in the day and night, and sometimes very obstinately, too, from hunger. In such cases the child is thought to have colic, and as it is not unfrequently costive, it is dosed with cathartics, carminatives, and opiates; or, it is being brought up partially or wholly upon artificial diet, and as a consequence, has some disorder of the bowels, which is thought to require other kinds of medicaments for its relief. When the stools are natural in appearance, or merely costive, and when the child does not labor under flatulence, it is easy, by careful questioning of the mother, to discern whether she has milk enough, and by examination of the size and weight of the child, to judge whether growth and nutrition go on in their proper ratio; and if it be found that the mother is a poor nurse, and that the development of the child is slow and imperfect, we should at once direct an additional supply of nourishment, and the suspension of all mere drugs. I have often been surprised and delighted to find how soon, under the new treatment, the child becomes placid and comfortable, how well and how long it sleeps, and at what a rapid rate it develops its form and size. So, when the circumstances above referred to coincide with a somewhat disordered state of the bowels, we should first choose for the child the diet most appropriate to its age and state of health, and then, if after inquiry it appears that the whole quantity taken in the twenty-four hours is below the proper standard, the amount allowed must be augmented.

The crying occasioned by pain in the head, by the pain which accompanies pneumonia or pleurisy, or that which is attendant upon abdominal inflammations, is never scarcely constant, though it may be violent while it lasts. Pain in the head usually causes a sudden and sharp cry or shriek, which is over as soon almost as heard, and which has been called the hydrencephalic cry. The pain of pneumonia, which, it should be remarked, is not unfrequently absent, or so slight as not to be noticed, commonly occasions crying only during coughing, and for a short time after, and is accompanied by distortion or grimacing of the features. In pleurisy, again, the cry is also heard generally at the moment of coughing, but it is produced also by the act of moving the child, and by pressure on the affected side. It is commonly much louder, shriller, and indicative of greater suffering than in pneumonia, and in some cases that I have seen, has been very frequent and difficult to appease.

The cry of intestinal pain may almost always be recognized by the fact that it takes place just before or after a stool, that it is accompanied by wriggling and twisting movements of the trunk, and especially of the pelvis, or in very young infants, by its coincidence with more or less flatulence, which is revealed by a tympanitic condition of the abdomen, and by frequent regurgitations of gas.

Children not unfrequently cry much and very obstinately from mere fretfulness and general distress or malaise. This kind of crying may be recognized by its peculiar tone, which is short, sharp, and irritable. It is a fret rather than a scream; it is occasioned by the least disturbance offered to the child, by the attempt to move it, to dress it, to attend to any of its wants, even to look at or notice it; it is moreover possible, generally, to still such a cry by soothing treatment, or by the endeavor to amuse the little thing with toys.

Lastly, a child will sometimes attempt to cry, but is unable to utter any or only a very faint sound. This depends commonly upon some laryngeal impediment, but may be also the result of pure exhaustion; there is not sufficient strength to sound a cry.

The cry of the young child has been divided by M. Billard into the cry proper and the return, and inasmuch as these two portions of the cry are differently affected in different diseased conditions, it is important that we should be aware of their existence, and of the effects produced upon their manifestations by disease.

The cry proper is produced during the act of expiration, while the return occurs during inspiration. The cry proper is sonorous and prolonged, the return is much shorter and sharper. The return is feeble in young infants, and becomes stronger as they advance in age. In different states of health, the mode of crying will vary to a considerable extent. The cry may exist alone, or in combination with the return, or again the return only may be heard, whilst the cry is from some cause suppressed. The distinction between the two portions of the cry may always be distinctly perceived in a child who is crying violently from any recent cause, whether ill-temper, fright, or pain, unless one or other has been suppressed by some morbid condition which interferes with the perfect performance of the vocal function. After a time, however, when the infant has become fatigued with its efforts, the cry proper ceases in part, and we have only the return, which is heard from time to time between the sobs. According to M. Valleix, it is the return which becomes enfeebled and disappears first, whenever one portion only of the cry is heard. Towards the fatal termination of all diseases, the return ceases more or less completely, and the cry assumes a peculiar moaning or murmuring, which must be familiar to all who have been much in the sick-rooms of children.

With a remark upon the condition of the lachrymal secretion in disease, I shall conclude this division of the subject.

The infant does not begin to secrete tears until towards the third or fourth month, and of course this function can furnish no sign previous to that time. After that period, however, the suppression of this secretion becomes, according to M. Trousseau, a valuable aid to prognosis, as this suppression occurs generally in all dangerous acute diseases. The occurrence of this symptom in any acute case should be looked upon, therefore, as one of dangerous augury, while the continuance of the secretion, or its reappearance after it has been suppressed, is, on the contrary, a highly favorable omen.

General Appearance of the Child; Development; Embonpoint; State of the Skin, etc.—While occupied in hearing the account of the sickness given by the mother or attendants, and even while asking questions in regard to the present state of the patient, the physician may learn a great deal that is useful, by an attentive observation of the general appearance of the child as it lies before him. He should study its size and development, its state of embonpoint or emaciation, its decubitus and gestures, the color, temperature, and dryness or humidity of the skin, and the presence of eruptions or swellings of any kind. Having remarked these various matters during the early part of the examination, he should proceed to inspect carefully the whole external surface by touch and sight, in order to acquire precise and accurate information upon these points.

A child who has been healthy from its birth ought to have attained a certain average size and development at a certain age. If, on the contrary, it be much below that average size, if at three months it look like a new-born child, or at a year old like one of six months, it is very clear that something has acted to determine such slow and insufficient growth, and it becomes the business of the practitioner to discover what the impeding cause has been. Not only ought a child to have a certain size and stature, but it should also be possessed of a certain degree of embonpoint. A perfectly healthy young child, one under four years of age, usually presents a much greater fulness and rotundity of the trunk and limbs than does the adult. Its tissues are firm and solid, its surface of a cool and pleasant temperature, its coloration of a clear and exquisite white, finely tempered with a faint rosy tint in a warm atmosphere, or slightly marbled with light bluish spots in a colder air. Few marks more certainly indicate a healthful temper of the constitution than the clear and exquisitely-tinted pink color of the palmar and plantar surfaces of the hands and feet of a young child. Nothing, indeed, can be more beautiful or perfect in shape or contour than the figure of a fine hearty young child; nothing more pleasing to the eye than its delicate but vivid coloring; and nothing more expressive of the fulness of health and vitality than its whole appearance.

When, therefore, instead of these marks of a pure and active state of the health, we meet with stunted growth, emaciation, soft and flaccid tissues, sallow and dingy tint of the cutaneous surface, pallid or bluish feet and hands, weak and listless movements,—how easy the conclusion that some jarring agent is at work to hinder and obstruct the machinery of life.

In acute diseases emaciation takes place rapidly, but the tissues still retain some degree of elasticity and firmness. In chronic diseases the emaciation is of course slower, but it is more complete, so that, in some instances, the frame seems to consist merely of the bones wrapped round with a dark and unhealthy skin. The tissues beneath the skin, the cellular, adipose, and muscular, are in great part absorbed, and the skin falls into wrinkles and irregularities on the least movement of the child. In some cases of disease, and particularly in those of the abdomen, the derm loses almost entirely its elasticity, so that when pinched into a fold by the fingers, it retains for some time the form that has been given to it.

The *decubitus* and gestures of the child ought to be noticed. Healthy children are, when awake, almost always in motion. Those who have attained the habit of walking are tempted to active exercise by their various plays and amusements. Infants, though they sleep much more than older children, are also when awake constantly moving their limbs; they are seldom still. When asleep they rest quietly and comfortably, generally upon the side, though often upon the back. How different when the child is laboring under disease of any kind. The disposition to movement is gone; the older child insists upon lying on the lap, or in the cradle or bed, and the infant is to be soothed of its crying and fretfulness only by rocking and fondling in the arms. Instead of the free and spontaneous movements of health, we now see only the sudden, impatient, and causeless tossing on the bed or lap, or the constant changing of position, with fretting or complaining, which constitute the *agitation* of sickness; or else the slow, languid, and hesitating movements of weakness or prostration; or lastly, the stillness and immobility of stupor or of coma.

There is nothing peculiar about the decubitus of pneumonia or bronchitis except when there is severe dyspnœa, in which case the child, if old enough to select its own position, lies high upon the pillows, while those who are younger evidently prefer to rest on the lap of the nurse, with the trunk and head supported in her arms, and express by crying and agitation, their discomfort and uneasiness, when placed in the recumbent position on the lap, or in the cradle or crib. I have seen several young children affected with severe bronchitis or pneumonia, who have preferred to any other position that of being held in the nurse's arms, with the front of the chest placed against her chest, and the head hanging over her shoulder. When the dyspnœa is so severe as to produce, by slow degrees, a partial asphyxia and consequent dulness of perceptivity, the child becomes soporous or comatose, and lies usually upon the back, as in diseases attended with prostration of strength.

In pleurisy and peritonitis the decubitus is usually dorsal, and the child dislikes to be moved or nursed, often crying violently when touched or disturbed.

In intestinal inflammations the young patient is usually excessively restless at first, and very fretful, unless the attack be grave and threatening, when it often lies still for a time from the prostration of strength which attends violent attacks, but becomes restless, turns and twists in the bed, cries out, and agitates the lower extremities at each evacuation of the bowels.

In the early period of cerebral inflammation there is generally excessive restlessness, and great irritability of all the senses and temper, but as the case goes on, and passes into the stage of coma, the child becomes still and quiet, assuming very often the decubitus called by the French "*en chien de fusil*," that is to say, on the side, with the inferior extremities strongly flexed, and the arms drawn close to, or crossed over the thorax. This position is especially characteristic of the latter stages of tubercular meningitis.

Extreme restlessness, constant tossing upon the bed, or incessant changing from the arms to the bed, or from bed to bed, is a very bad sign. I have observed it in several different affections; especially in obstinate pneumonia, in long-continued intestinal disorders, and in the secondary inflammations of measles and scarlet fever.

Amongst the gestures most deserving of attention are the sudden starts, attended with cries, which indicate the occurrence of some painful sensation, as that of colic, of stitch in the side in pneumonia and pleurisy, and sometimes of shooting pain in the head. The frequent carrying of the hand to the head, or to the ear, ought not to pass unnoticed, as this is often indicative of headache or earache. So also of the constant application of the hand to the mouth, or the introduction of the fingers into that cavity, which often occurs when the child is suffering the odontalgic pain of dentition. Nor should the physician ever neglect to observe any peculiar and especially any automatic movements of the limbs, and particularly of the fingers or toes. Nature often heralds the approach of a convulsive seizure by certain peculiar muscular movements. The thumbs are drawn into the palms of the hand, and the fingers clasped over them; or the toes are strongly bent towards the sole of the foot, or rigidly extended: sometimes the fingers are for an instant convulsively extended upon the hand and drawn widely apart from each other; or lastly, the muscular movements, instead of being easy, steady, and natural, are badly co-ordinated; they are irregular, uncertain, and tremulous. This latter character, tremulousness and uncertainty, I have often noticed.

The occurrence of paralysis will often be unperceived for some length of time by an inattentive observer. It is to be discovered by the failure of the child to move one limb, whilst the others are more or less agitated, or by taking hold of the limb, and comparing the total want of resistance in it, with a certain stiffness and opposition to movement almost invariably present in the healthful condition.

The state of the cutaneous surface is always important, and ought to be carefully and systematically examined. The points most requiring to be noted are its temperature, dryness or moisture, coloration, and the presence of eruptions or swellings. By the temperature, and dryness or moisture, taken in connection with the rate of circulation, we must judge as to the existence of fever. The inferences to be drawn from the condition of the surface in these respects are the same in children as in adults, and they need therefore no particular consideration in this place.

The coloration of the skin, on the contrary, owing to its great susceptibility to change in certain affections, becomes, in the diseases of early life, of very considerable importance in diagnosis, and deserves therefore some special remarks.

The physician should be aware, in the first place, that the color of a new-born infant is some shade of red, varying from a deep brick-red tint, to one of a much lighter hue. The red appearance fades away usually in about four or five days, and leaves the surface of a yellowish-white, or in some instances of a decidedly yellow color. The yellow color is sometimes so marked as to impose very readily upon an inexperienced person the idea that it must depend on an affection of the liver, or, in other words, that it constitutes a true jaundice. In a very large majority of cases, however, the conjunctiva retains its natural white tint, the digestive functions go on with perfect regularity, there is no fever, and indeed nó marks of decided disorder of the health, so that the icterode hue cannot depend, under these circumstances, on any serious lesion of the liver or its appendages, and it is manifestly wrong to regard the case as one of disease, or as requiring any treatment.

Besides the yellow color just described, the cutaneous surface in children, and particularly in those under three or four years of age, very often exhibits different shades of a bluish color, which need some attention. When the whole skin assumes a decidedly blue tint, the case is one of cyanosis or morbus cœruleus, depending on some malformation or disease of the heart or lungs. In severe cases of this kind, the blue color deepens into a purple or even blackish hue. If this appearance last more than a very few days, there can be little doubt that it depends on some malformation or disease of the heart.

It is quite common to observe in new-born and very young infants a bluish tint of the hands and feet, and of the parts around the mouth, whilst the rest of the body is pale. These appearances depend usually on some obstruction to the pulmonary circulation, as that caused by atelectasis pulmonum, bronchitis, or pneumonia, and they increase, diminish, or disappear, according to the course of the causative malady. In older children, the blue color of the skin is rarely of any considerable intensity, unless the condition has existed from birth, or soon after; but it is not at all uncommon to meet with faint, but quite perceptible shades of that color, depending on the asphyxiated state which occurs in croup, capillary bronchitis, pneumonia, and sometimes in laryngismus stridulus. It is hardly necessary to add that a very slight blueness of the fingers and toes is sometimes observed in the cold stage of intermittents.

Occasionally we meet with an excessive harshness, aridity, and scurviness, with a wrinkled appearance of the skin, especially upon the abdomen and thorax. This symptom, when strongly marked, is usually attended with enlargement of the superficial veins of that part, and is then very striking even to a careless observer. It accompanies very generally the abdominal tuberculosis of children, and should not pass unobserved. Though generally indicative of tubercular peritonitis, or of tuberculosis of the mesenteric glands, it is not always so, since in a case that occurred to myself, and in which it was perfectly well-marked, a post-mortem examination showed it to have been caused by a chronic peritonitis, resulting from inflammation and suppuration of the mesenteric glands entirely independent of tubercular disease. The peritonitis had given rise to extensive adhesions amongst the intestines, and the pus had found its way by a tortuous sinus between the intestines into the vagina, through which it was discharged externally.

There is one other alteration in the color of the skin which is deserving of notice in a practical point of view. It is an excessive pallor, occurring sometimes in diseases which obstruct the respiratory function. I have been most struck with it in the capillary bronchitis, or suffocative catarrh, of young children, and in membranous croup. The whole surface assumes a dead white hue, which seems to depend on a total want of blood in the cutaneous capillaries. The nose is white, the ears become white and diaphanous, and the only relief the eye meets with in gazing upon what seems an almost alabaster countenance is the still pink or bluish lips, the dark eyebrows and eyes, and perhaps a somewhat leaden tint of the circumference of the mouth and of the forehead. In strongly-marked cases the whole surface exhibits this white or blanched appearance, even the fingers and toes. When this condition has lasted for several hours, or a day or two, the hands and feet sometimes assume a bluish look, which may last until death occurs, or until the attack approaches a favorable termination. This condition of the surface, when occurring in cases attended with obstruction of the respiratory function, has always appeared to me an indication of imminent danger to the patient; and, indeed, when it lasts more than one or two days, it has very generally proved the harbinger of death.

The clinical examination of the cutaneous surface cannot be considered complete until it has been made with reference to the presence of eruptions, of swellings from œdema, of inflammation, tumors, and lastly, of diseases of the joints. The inquiry in regard to the presence of eruptions is a very important one, from the fact that children are particularly liable to attacks of the exanthematous and other eruptive affections. Many attacks of sickness, beginning with violent fever and other serious symptoms, which would otherwise remain entirely obscure, or unexplained, until a much later period from the onset, may be accounted for at an early period by a minute examination of the skin. So, in the latter stages of long and debilitating maladies, in the disorders which follow scarlatina, and in cardiac and hepatic diseases, a proper inspection of the surface will reveal œdematous effusions that might, if this search were neglected or carelessly prosecuted, remain undiscovered. The same remarks will apply to inflammations of the articular cavities, to the swelling of the joints produced by rheumatism, and to some obscure suppurative inflammations in the limbs of children. Not long since I had an instructive example in my own practice of the necessity of this close examination. A healthy male infant, five weeks of age, was seized suddenly with most violent fever, the reaction being not unlike in character that of acute rheumatic fever. The only visible disturbance of the health to explain this violent attack was a certain amount of digestive derangement, and for this the patient was treated. After three days of most severe illness, with strong tendency to convulsion, and with some stiffening of the lower jaw, I was asked to look at the right thigh. It was largely swelled, especially in its lower half, it was hard to the touch, and the skin over the outside of the limb just above the knee, had assumed an inflammatory redness. It was clear that the child had been attacked with an acute inflammation of the deep tissues of the thigh, and that this was now approaching the surface and becoming visible. Careful inquiry now brought to light the fact that the baby, all through the sickness, had cried severely and as though in sharp pain, whenever it was moved, and especially when its napkins were changed. The distress observed when the napkins were being changed, had been ascribed to some smarting from the urine. Had the surface of the child been more carefully examined at an early period, the swelling of the thigh, and the pain on motion, might no doubt have been detected then, and the intense febrile reaction, with the nervous symptoms, which were thought too great for simple functional disorder of the digestive functions, would at once have been explained.

It is clear, therefore, that in infants and in children under six or even eight years of age, the physician must depend, in great measure, for information as to the nature of the case, on his own unassisted explorations, and knowing this he should leave nothing neglected that may aid him to gauge with accuracy the state of health of the individual before him. He should cultivate a *habit* of minute, systematic, and patient investigation, since, by accustoming himself to such a method in his daily walks, he will assuredly attain in the end a tact and sagacity that will not often be at fault.

THE PULSE.—The pulse of the child, in order to be judged of to any real advantage, must be examined during the state of quiet, and, if possible, it should be felt whilst the child is either asleep or dozing. During the waking state, a young infant is in such constant motion, that it is very difficult to perceive the pulsations of the radial artery, and impossible to judge of their force or volume, in consequence of the rising and falling of the flexor tendons of the forearm, and because, also, of the natural softness and delicacy of the pulse at that age. In older children, the moral disturbance occasioned by the visit of the physician in most instances, and the irritability and nervousness accompanying the sickness, will either cause the patient to resist the attempt to touch the arm, or else produce so great an effect upon the rate and force of the circulation, as to render very uncertain and unsatisfactory any conclusions to be drawn from the examination. If possible, therefore, the circulation should be examined during sleep. If this be impracticable, the child ought, when still nursing, to be put to the breast, or when weaned, it ought to be quieted by soothing treatment, by toys, or by the promise of a toy.

It is essential that we should know what is the average of the healthy pulsations of the child, in order to obtain a standard of comparison by which to judge of any departure from that average in disease. Observers have varied not a little in the results at which they have arrived by their examinations upon this point. By selecting those, however, which appear to have been made with the greatest care, and under the most favorable circumstances, we shall doubtless obtain an average entirely worthy of confidence. It will be necessary, also, to obtain averages for different periods of childhood, since the rate of the circulation varies to a very great extent at different ages. I shall therefore give the rate of the circulation for newborn children (one to ten days old); for the period from four months to six years; for that from six to nine years; and for those from nine to twelve, and from twelve to fifteen years of age.

The average rate of the circulation in very young infants is from one hundred and one to one hundred and two in the minute, the former being the result obtained by M. Billard in children from one to ten days old, as nearly as it can be gained from his statements, and the latter, the one obtained by M. Roger, in infants from one to seven days old (*De la Température chez les Enfants*, Paris, 1844). The physician ought, however, to be aware of the fact that, though the above is the average rate of the circulation at the age mentioned, the pulse may range very much above or below that average, without necessarily indicating a morbid state of the health. Thus, though the average frequency in forty children from one to ten days old, observed by M. Billard, was one hundred and one, it was less than eighty in eighteen, whilst in fourteen it was between one hundred and one hundred and twenty-five, and in six between one hundred and thirty and one hundred and eighty. All these children, he assures us, presented every mark of good health.

The average frequency of the pulse during the first year may be stated at about one hundred and fifteen, at least such is the result obtained by me from an examination of seven observations by M. Roger of children from four to nine months old. This result, it will be observed, shows that the pulse is not so frequent during the first few days after birth, as it becomes at a somewhat later period, which, moreover, agrees with a previous statement to the same effect made by M. Valleix. This latter author is of opinion that at seven months of age the pulse is much more frequent than some days after birth, and that it afterwards falls gradually as the child advances in years.

I am not acquainted with any observations upon the rate of the circulation during the second year of life, except those of M. Trousseau, who, according to M. Bouchut (*Manuel Prat. des Mal. des Nouv.-Nés*, p. 133, Paris, 1845), gives as the average between one year and twenty-one months, one hundred and eighteen.

M. Becquerel (*Traité Théorique et Prat. des Mal. des Enfans*, Paris, 1842), gives us the result of his observations upon thirty children, between two and six years of age, during sleep and in the waking state. During sleep the average was seventy-six; in the waking state, it was ninety-two.

Between six and nine years of age, the same observer found the average during sleep to be from seventy-three to seventy-four, whilst in the waking state it was ninety. Between nine and twelve years, the average was, during sleep, seventy-two, in the waking state, eighty. Between twelve and fifteen years the rate was seventy whilst the children were asleep, and seventy-two when awake. Roger gives seventy-seven as the average between six and fourteen years.

One very striking fact attracts our attention in the above statements: the much greater difference between the rate of the circulation during sleep and during the waking state, in very young children, and in those who are somewhat older. Thus, whilst there is a difference of seventeen pulsations in the minute, in the rate of the circulation during sleep and in those who are awake, between the ages of two and six years, the differences under the two conditions mentioned, amounts to only two pulsations in the minute in children that have reached the age of between twelve and fifteen years.

The circulation is somewhat more rapid in girls than boys. This difference should be borne in mind, but as it amounts to only about five beats in the minute, it is insufficient to be of any very decided value in diagnosis or prognosis.

After these specifications as to the rate of the circulation in children, I shall pass on to some general remarks upon the method of examination of the pulse, and upon some other of its important characters.

M. Bouchut (*Loc. Cit.*, p. 129) remarks that in infants at the breast "the palpation of the pulse is almost impossible. It may be counted, but its force, feebleness, size, and hardness, can scarcely be appreciated; the intermittent character is the only phenomenon upon which no doubt need rest; it is, moreover, the only one of any value." These opinions of M. Bouchut, though true in some degree, are much too strongly stated, for I am quite sure that it is very easy to detect great differences in the force, size, and tension of the pulse of the same child in health and in disease, and of different children laboring under different diseased conditions. These differences can be detected by careful observation from a very early age, and after two months may be readily recognized, when the variation from the state of health is at all considerable.

The intermittence of the pulse above alluded to, should rather be expressed by the word irregularity, since the pulse is not properly *intermittent*, but merely *irregular* in its rhythm. This is quite a common feature in the pulse of children, and, be it noted, is much more frequently met with during sleep than in the waking state. M. Becquerel met with irregularity of the pulse in twenty-four of one hundred and fifty children examined during the waking state, and in fifty-five of one hundred and fifty during sleep. It is clear, therefore, that mere irregularity of the circulation, independently of other symptoms, is not a sign of disease, since it was present in one-sixth of those awake, and in a little more than a third of those asleep. It should be observed, too, that the greatest irregularity exists when the pulse is lowest (in sleep). The chief practical bearing of this fact is that we should be careful not to lay too much stress upon slowness and irregularity of the pulse, as signs of tubercular disease of the cerebral meninges, unless they are observed during the waking state, and in connection with other symptoms, particularly with vomiting, constipation, and severe headache.

Another very important characteristic of the circulation of the child, is its extreme irritability, which causes its rate to vary to an extraordinary degree, even in perfect health. This is the more marked in proportion as the child is younger. The slightest disturbance, whether moral or physical, will cause the pulse to rise in a young child, from one hundred or one hundred and fifteen, to one hundred and twenty, one hundred and thirty, or even one hundred and fifty. From this circumstance may be drawn the inference also, that the pulse should always be examined, as before stated, during sleep, or during profound quiet.

There is still another reason which makes it necessary to touch the pulse during sleep or profound quiet. This is, that when the child is agitated, it becomes literally impossible, in consequence of the contractions of the flexor tendons of the arm, and of the movements of pronation and supination, to judge with accuracy the various qualities of the arterial action.

Examination of the Heart.—The examination of the heart by auscultation and percussion ought, and to be of essential aid in diagnosis, must be performed whilst the child is still and quiet. It is best made during sleep, especially in infants; when this is impossible, it can be performed with great advantage during the state of quiet that follows nursing, or during that which may often be procured by soothing management, or by taking advantage of the fondness that infants show for a strong light, the view of which will generally suffice to occupy and keep them still.

The sounds of the heart present the same general characters in the child as in the adult. They are, of course, more feeble and more rapid, conditions which make it difficult, in the young infant, to perceive and appreciate any minute change from the healthful sounds. After the age of one and two years, however, when the circulation has become slower and more steady, the signs yielded by the physical examination of the heart become much more valuable and positive, so much so, indeed, as to yield results almost as important as in the adult. The first sound is almost always duller than the second. They succeed each other commonly with perfect regularity, and have the same interval between each, in the same child. The cardiac sounds are readily heard by placing the ear over the præcordial region. The extent of surface over which they may be heard, will depend on several conditions, particularly the state of quiet or agitation of the child, the presence or absence of fever, the state of the lung as to its consistence (constituting it a better or a worse conducting medium of sounds), and the condition of the heart itself as to health or disease.

In a healthy child, who is undisturbed by any cause of irritation, and particularly in one sleeping, the sounds are distinctly audible over the whole præcordial region, and under the left clavicle. In many subjects they can be heard over the whole front of the thorax, but become, of course, feebler, in proportion as we recede from the præcordial region. Usually they are heard quite as distinctly under the right clavicle as over the right nipple of that side, in consequence, no doubt, of their transmission in an upward direction by the aorta. They are never heard over the posterior walls of the chest in children in perfect health, and whose circulation is entirely undisturbed. In those who are awake and agitated, and in those who have been making severe muscular exertions, the cardiac sounds are very loudly audible over the whole front of the thorax, and even through to the back of the chest.

When the lungs are indurated by inflammation, as in pneumonia, they transmit with great distinctness, from having become better conducting media, the cardiac sounds to the back. This circumstance sometimes becomes a valuable aid in the diagnosis of pneumonia. I have been enabled to satisfy myself of the existence of pneumonia in the lower lobe of the right lung, in a doubtful case, from the fact that the sounds of the heart were much more clear and distinct over the right inferior, than over the left inferior dorsal region.

The præcordial region is decidedly less sonorous on percussion than the parts of the thorax directly over the lungs. This diminution of sound is distinct enough to be evident to any ordinary ear, but it rarely amounts to absolute flatness. The region exhibiting this dulness of sound is the same in position as in the older person. It occupies the space corresponding to the cartilages of the fifth, sixth, and seventh ribs, and is situated, therefore, between the left nipple and the left edge of the sternum. Its measurements, as given by MM. Rilliet and Barthez, are one and a half to three inches in a transverse, by one and a half to two and a half in a vertical direction. The region of dulness is described by those observers as being represented by a circle or ellipse, the transverse diameter of which extends from the nipple to the sternum, or more rarely towards the xiphoid cartilage. In children over six years old the nipple sometimes lies above the middle line of this space.

RESPIRATION; ITS RATE AND GENERAL CHARACTERS.—The respiration, like the pulse, to be examined with any advantage to the explorer, must be investigated whilst the child is still and quiet. In the young infant it should be done during sleep, as it is only then that we can find the breathing uninfluenced by disturbing causes other than those connected with deranged health. In the older child, the play of whose functions is more steady and regular, and less readily jarred by trivial causes, this part of the clinical exploration may be made during the waking state; but, still, it must be done whilst the patient is quiet and tranquil, else the results obtained will necessarily be less certain and reliable than under the opposite state of things.

The respiration ought always to be counted by the watch, if possible, especially by the young practitioner. This is the only mode in which a perfectly accurate idea of the frequency of the respiration is to be obtained. It sometimes happens that a greatly increased rate of the breathing will pass unnoticed by the physician, from the fact that it continues to be regular, and without effort. I have known children to breathe eighty times in the minute without presenting any appearance of labor or effort in the act, without cough, and without the least wheezing or sound to be heard at a short distance from the patient. Under these circumstances the great rapidity of the respiration might very well pass unnoticed, especially by inexperienced practitioners; and, be it remarked, this would be particularly apt to happen were the attention of the physician addressed to some other part of the economy than the thorax, as the seat of the sickness. For instance, in latent pneumonia, when this simulates meningitis, or when it is conjoined with gastro-intestinal symptoms, the failure to note a greatly increased rate of the breathing might very well occur. In many cases of secondary pneumonia it might also take place. In children, who have been long sick with diseases that debilitate and impoverish the health, a sudden aggravation of the symptoms dependent on collapse of the lung might be misunderstood and falsely explained, for the want of this precaution. It is therefore a good and useful rule for the young practitioner always to count the respiration, when he has to do with a case presenting the least obscurity of diagnosis, since this simple habit may guide him to the real seat of disease, which else he might mistake.

The rate of the respiration in children is very different at different ages, a circumstance that should always be recollected in the examination of their diseases. The average frequency of the breathing in new-born children and during the first week of life, is thirty-nine, according to M. Roger. It may rise, however, upon very slight disturbances, to fifty, sixty, or even eighty, while it is not at all unusual to find it at twenty-five or thirty in perfectly healthy infants during sleep. Between the ages of two months and two years the average is about thirty-five. Between two and six years, the average is eighteen during sleep and twenty-three during the waking state; from six to twelve years, the average during sleep is eighteen, and in the waking state twenty-three; from twelve to fifteen years, it is eighteen in the former, and in the latter twenty. It will be observed, therefore, that after the age of two years, the rate of the respiration is nearly the same throughout the remainder of the period of childhood; it changes so little, indeed, that the same average will answer for all practical purposes throughout that period.

The other characters of the respiration require some attention on the part of the practitioner. In the first place, the diaphragm plays a more important part in the process in the child than in the adult. In the young infant, indeed, the function is carried on almost wholly by the action of that muscle, so that the respiration is correctly described by the technical term of abdominal. The walls of the chest are almost motionless. On this account the rate and characters of the breathing can be best studied in young children, by examining the abdomen, the movements of which being strong and marked, are much more easily seized by the eye than are those of the thorax.

During perfect quiescence, and especially during sleep, the breathing of a young child is soft, regular, though less so than in the adult, and perfectly noiseless; it is necessary to place the ear close to the face or chest of the child, and to listen attentively, in order to hear it. In the young child, and especially the young infant, the breathing is, in the waking state, very different from that of the adult. It is short, irregular, uneven, and marked by occasional pauses, followed by a hurry and precipitation of the movements. These peculiarities in the respiration of the infant, appear to depend on the weakness and imperfect action of the muscular apparatus at that early age, which causes the various movements of the body to be hesitating and uncertain, and without that steadiness and evenness which are characteristic of matured strength. After the age of two years, these irregular and tumultuous movements cease, and the breathing becomes more regular and even, like that of adults.

In the inflammatory affections of the lungs,—pneumonia, bronchitis, and pleurisy,—the respiration is almost invariably accelerated. In extensive pneumonia, and in capillary bronchitis, it becomes very rapid, rising to eighty or one hundred in the minute. In pleurisy and simple ordinary bronchitis, it seldom becomes so frequent, not exceeding, usually, forty or fifty. In severe pneumonia, the rhythm of the movement sometimes becomes inverted: the pause occurs at the termination of the inspiration instead of the expiration. The patient makes first a violent and labored expiration, bringing into a kind of convulsive action all the expiratory muscles of respiration; instantly after the expiration follows a rapid and full inspiration; then occurs a momentary pause, and again the respiratory act begins with the labored expiratory effort. This kind of respiration is a very unfavorable symptom, as it is indicative of a most dangerous oppression. It is particularly apt to occur in infants, and very young children. It has been called *expiratory* respiration.

The respiration, though almost invariably accelerated in pulmonary inflammations, sometimes retains its normal rate, or even falls below that rate. This occurs, I believe, only under one condition of things; when the forces of the constitution have been sapped by previous disease, or exhausted by the long continuance of the thoracic inflammation. It is therefore met with in cases of secondary inflammations, and in those of the chronic form.

The respiration is very much increased in frequency as a general rule in the form of disease recently described under the title of Atelectasis Pulmonum, or collapse of the lungs. When, therefore, a young child who has been exposed to the causes of this diseases (feebleness at birth, exhausting disease, or debilitating hygienic conditions), is suddenly seized with hurried respiration, slight cough, paleness or blueness, with coldness of the cutaneous surface, and in whom there are but few and unimportant physical signs of pulmonary disease, there is very good reason for supposing that some portion or portions of the lungs have become collapsed, or in other words, have ceased to admit air.

The respiration often lends some assistance in the diagnosis of cerebral affections. In acute meningitis, accompanied by violent febrile reaction, it is more frequent than natural, but often irregular. When the early stage passes into the stage of coma, the breathing becomes slow and irregular. In tubercular meningitis it is seldom increased in frequency except for a day or two before death, whilst in the middle period of the disorder, it is either continued at its normal rate, or becomes slower. During that period, also, it is almost always extremely irregular, and is interrupted by long and mournful sighs, which, to the ear of the experienced physician, who hears in them the almost certain prognostic of approaching death, have an inexpressibly touching sound, increased tenfold by the consciousness of his utter inability to control the fatal tendency of the malady.

There is a peculiarity of the respiration noticed by Dr. George A. Rees, as occurring in collapse of the lung or atelectasis, and which I have myself seen, that ought not to be passed by unnoticed. It is that, during the inspiratory effort, the ribs move inwards or backwards, towards the mesial line of the trunk, instead of outwards, as in ordinary respiration, thus diminishing in place of increasing the transverse diameter of the thoracic cavity. The explanation of this peculiarity is the following: "When the diaphragm descends, unless the lung expand at the same time, a vacuum would result if the thoracic walls remained immovable, or enlarged as in healthy respiration; but the parietes being flexible, especially at this early period of life, yield to the external atmospheric pressure, pass inwards instead of outwards, and the capacity of the cavity continues in relation with the imperfectly expanded lung."

AUSCULTATION AND PERCUSSION OF THE LUNGS.—This portion of the examination of the sick child ought to be performed, if possible, whilst the patient is still and quiet. Unfortunately, however, it happens in a large majority of cases that the disturbance of position necessary to effect the exploration, and the presence of the physician, together with the irritability of nerves and temper occasioned by sickness, almost always cause more or less resistance on the part of the child, and produce violent screaming and struggling. In young infants we have to contend only against the instinctive resistance to any physical disturbance naturally attendant upon sickness and suffering. In older children, who have learned to distinguish between familiar and strange faces, and in whom the will has begun to act, there is added to the instinctive resistance of the infant an opposition of the most strenuous and annoying kind, founded upon the natural fear of a stranger, and upon a mental determination not to be interfered with or incommoded by the movements and changes of position necessary for a careful examination.

For these reasons, the physical exploration of the chest in young subjects is often to be accomplished only with great difficulty, and in the midst of the most violent screaming, struggling, and contention. It is clearly important to avoid these obstacles if possible. This can only be done by the employment, on the part of the attendants and physician, of the most soothing, gentle, and patient management; and in this way, let it be remarked, it can be done in a large majority of cases. The possession by the physician of a quiet and yet decided manner, the power to interest and attract the child by entering with active sympathy into its little amusements and pursuits, the skill to engage its attention by the exhibition of some book or toy, or the mere influence he may exert to calm its terror or excited irritability, by a soothing voice and gentle persuasion, will, in many instances, overcome any resistance offered to the examination by children over two years of age. Nevertheless, in very young children, and in not a few that are older, no gentle means whatever will overcome opposition. Here the exploration must be made in the midst of struggles and cries, and though the results obtained will be less clear and positive than when the child is reasonable and obedient, a great deal of most valuable information can be acquired by a quick and dexterous practitioner. The percussion can be made in the short intervals between the cries, or even during their continuance, and by placing the ear close to the finger by which it is performed, the sounds elicited can be very well heard and judged. The auscultation is more uncertain; but, by watching intently the long and deep inspirations which immediately precede the violent cries, the presence or absence of râles, and their characters, the degree of freedom with which the air enters the lung, and the existence or non-existence of bronchial respiration, can, after some experience, be ascertained and commented upon, so as to give considerable certainty to the diagnosis.

The particular position in which to place the child, during the examination, is of some importance. After the age of three and four years the position may be the same as that selected for the adult, if only the patient be reasonable and tractable. When, on the contrary, the child resists, it should be taken on the lap of the mother or nurse, or else held in the arms, with the head inclined over one shoulder, while its back is presented to the practitioner. Infants within the year may sometimes be examined whilst engaged in the act of sucking; but this is inconvenient, both from the constrained position, and from the circumstance that the inspirations are short and imperfect during that act. The French authors recommend that the very young infant should be laid, with its face downwards, across the hand of the practitioner, who is then to approach the back of the chest to his ear. I have found either one of the three following positions most convenient, as the case may be: the infant laid across the lap of the mother, with its face downwards, and the head hanging a little over one knee; held in the arms, with the front of its body placed against the mother's chest, and the head lying over her shoulder; or, lastly, a favorite position of mine, placed in a sitting posture upon the lap, supported by one hand in front, and by the other holding the occipital portion of the head.

Auscultation should always be performed before percussion, because the latter generally alarms or annoys the child, and occasions crying, which of course would interfere more or less with the auscultation, were this performed after percussion. The auscultation should be made with the ear rather than the stethoscope, for the reason that the instrument terrifies the child, and also because it cannot, when the child resists and struggles, be kept in contact with the chest. Moreover, the instrument is unnecessary except for the examination of the upper portions of the thorax in front, and it had better, therefore, be dispensed with.

Percussion is best made in children by using a finger of the left hand as the pleximeter, and by striking with one finger of the right. One finger is quite sufficient to elicit all necessary sound in young subjects. The strokes should be light and distinct, consisting of short, quick, and gentle taps.

To perform auscultation and percussion with success, the surface ought to be quite uncovered. The habit of examining the thorax through one, or several thicknesses of clothing, which some persons fall into, is a most careless one, and cannot but lead to uncertain and erroneous results.

As a general rule, it is sufficient, in young children, to examine the posterior portion of the thorax. Doubtless, it is more accurate and artistical to explore the whole chest, and this ought to be done in all obscure cases. But when the child is sick and suffering, when it is irritated and exasperated by the presence of a stranger, or by coercion, and still more, when it is weak and exhausted by long or violent illness, it becomes of the greatest importance to shorten, as much as possible, the time occupied in the examination. For these reasons, it is well to be aware of the fact that, in nearly all inflammatory diseases of the lungs, the morbid changes affect first and most severely the posterior surfaces of those organs. This is thought to depend on the fact that the child passes so large a portion of its time in the recumbent position as to cause the fluids of the body to gravitate towards the dependent parts of the lungs, and thus to determine the beginnings of inflammatory action in that direction. Certain it is, be the explanation what it may, that it is rare to find the anterior surface of the lungs affected either with bronchitis, pneumonia, or pleurisy, the posterior surface remaining healthy. When, therefore, upon auscultation and percussion, no signs of disease are met with over the dorsum of the thorax, we may feel pretty well satisfied that the lungs are healthy. Nevertheless, in all doubtful cases, the examination ought to be extended to the whole chest, in order to make what was, before this has been done, only a strong probability, a certainty. Whenever, also, it is important to ascertain the precise amount of disease in any serious or long-continued sickness, the front as well as the back part of the chest must be examined.

The *respiratory sounds* are not of the same character precisely in the child as in the adult, and of this the physician ought to be aware. In children the vesicular murmur is stronger than in the adult, so that it assumes somewhat of a blowing or bronchial sound. It was in consequence of this peculiarity that Laennec gave it the name of puerile respiration, which, though a mark of health in early life, is, at the period of maturity, an indication of a morbid change in some portion of the pulmonary parenchyma. It ought to be remarked, however, that in infants under two, and particularly in those under one year, the vesicular murmur is, in ordinary respiration, weaker than in adults; owing, no doubt, to the fact that the inspirations are short and imperfect, not distending the lungs to their full capacity. When, however, from any cause, a sigh, a sudden disturbance, or the act of crying, a full and complete inspiration takes place, so as to dilate thoroughly the pulmonary structure, the murmur becomes at once loud and strong, or, in other word, *puerile,* as in older children.

The murmurs of inspiration and expiration bear the same relation to each other as in the adult; the expiration being much shorter and feebler than the inspiration, though, at the same time, it, like the inspiration, is louder than in the adult. In some instances, however, and especially over the posterior inferior and lateral regions of the thorax, no sound whatever is heard during the accomplishment of the expiration. This absence of sound during expiration is the more apt to be met with in proportion as the child is younger.

When a young child is made to breathe forcibly and rapidly, the respiratory sounds assume certain characters, even in perfect health, which might mislead an inexperienced observer. The inspiration is short, loud, and hard, so as to assume somewhat of a blowing character, resembling not a little the sound of bronchial respiration. At the same time, the expiration becomes louder also, and longer, which two circumstances, rude or even blowing inspiration, with loud and somewhat prolonged expiration, may very well deceive a young or careless practitioner.

The respiration is most clear and characteristic over the anterior, lateral, and posterior inferior regions of the thorax. Over the origin of the larger bronchia, that is to say, in the interscapular region, the respiration is very strong, so as to resemble very closely bronchial blowing. Here, also, the expiration is often very marked; it is sometimes heard as long, or even longer than the inspiration. Over the scapulas the sound of respiration is always feebler than elsewhere, except in the præcordial region, from the interposition of the scapulas and of thick muscles between the ear and the lung.

Percussion yields a much louder and more sonorous sound in children over two years of age than in adults,—a circumstance always occurring coincidentally with the presence of puerile respiration, and dependent on the fact that the function of respiration is, at that age very active, and the lungs therefore filled to their utmost capacity with air. In infants under two years of age, the sonorousness varies to a considerable extent in the same child. When the respiration is, as it usually is, gentle and easy, the inspirations being rather feeble and incomplete, the amount of air contained in the lungs will be somewhat deficient in comparison with what their cells might contain, and the sound yielded upon percussion will necessarily be rather dull and insonorous. When, on the contrary, the respiratory process is quick, active, and energetic, from any cause, so as to give rise to the auscultatory phenomenon called puerile respiration, the percussion will be loudly sonorous, as it is in the later periods of childhood, owing to the thorough dilatation of all the air-cells, and the consequent presence in the thoracic cavity of a large amount of air.

The sonorousness of the thorax is different in different parts in children, as in adults. In front, the percussion is most sonorous from just beneath the clavicle on the right side down to one or two inches below the nipple, where it gradually becomes dull, owing to the position of the liver. On the left side the sonorousness is modified by the presence of the heart in the manner already mentioned. Below the præcordial region we again have pulmonary resonance down to the sixth or seventh ribs, below which is heard the tympanitic sound of the stomach.

Behind, the sound is very dull above the spine of the scapula, and considerably so over the scapula beneath its spine. Over the interscapular space it is clear and strong, and more so in the lower than in the upper half. Beneath the inferior angle of the scapula, likewise, it is clear and full, until we approach the inferior margin of the thorax, where it is dulled, even above the lower edge of the lungs, by the presence beneath of the liver on one side, and of the spleen on the other. Over the right side the dulness begins a little higher than over the left, in consequence of the greater bulk of the liver than of the spleen.

The lateral regions are very resonant in their upper portions, but become dull as we approach the liver on the right side, and the spleen on the left. On the left side the pulmonary sound is often entirely eclipsed by a tympanitic resonance occasioned by the presence of gas in the stomach.

In practising percussion in children it is necessary to strike gently, because, from the great natural sonorousness of the chest in early life, any considerable force would bring out so much sound as to prevent the recognition of a degree of dulness which might readily be perceived by the use of more gentle blows. It is necessary always to compare the two sides together as in adults, since this often leads to the detection of a degree of obscurity which might be otherwise inappreciable. Yet, and the physician ought to be well aware of this, the comparison of the two sides is not quite so useful in young as in mature subjects, because of the fact that the diseases in which the differential comparison is most important, pneumonia and pleurisy, are more frequently double than in adults. It becomes, for the same reason, very important to compare the upper and lower portions of the thorax behind, since we may assure ourselves of the existence of dulness below, of which we were before doubtful, by the fact that the sound is less sonorous in that region than above, which is, as already stated, the very opposite of the healthy condition.

EXAMINATION OF THE ABDOMEN.—It is often very important to ascertain by palpation, the form, size, and degree of tension of the abdomen, the presence or absence of effusions within its cavity, and the condition of the organs which it contains; to learn by percussion the degree of resonance which it affords; and lastly, to find by pressure whether it be unnaturally tender to the touch or not. By a careful inquiry into these various points, and a proper comparison between them and the rational symptoms presented by the patient, we shall be able to discover the existence of tumors, of hypertrophied organs, of unusual developments of gas in the intestines, of dropsical effusions, of enlarged and hardened mesenteric glands, of gurgling, and of soreness on pressure, caused by inflammation of some of the contents of the cavity. The examination should be made, if possible, whilst the child is still and composed. It is best, therefore, to perform it before auscultation and percussion, in children who are old enough or amiable enough to be willingly quiet, since the length of the examination of the thorax often wearies out their patience, and they refuse to submit to further inspection; whilst in infants and in children who obstinately resist the examination, it matters little at what particular period it is attempted, since it must be done at last in the midst of cries and general agitation. It is, at all times, a difficult and not very useful examination, unless the patient consents to it freely and without fear. It is very necessary, therefore, to resort to every means to obtain this quiet consent. In children over a year old, this condition is to be obtained only during deep sleep, during the act of nursing, or when the patient is awake, by so pleasing and attracting its attention by toys, by soothing voice and manners, as to cause it to forget what is passing. The reasons why the examination is useless unless made during a state of calm, are very obvions. In the first place, the contractions of the abdominal muscles give to the walls of the abdomen such a degree of hardness and rigidity, that it is impossible to learn anything in regard to the state of the parts within, except merely what can be learned by percussion; and in the second place, no acuteness of perception will enable us to distinguish between the cries of anger and fright, and those that may proceed from pain occasioned by pressure.

M. Valleix recommends a plan in the case of young infants, by which tenderness on pressure may very generally be recognized. It is as follows. He carries the child, carefully sustained in the arms, suddenly before a bright light, either that which pours in at a large window, during daylight, or that of a bright artificial light at night. The infant, whose greatest pleasure consists in gazing at a bright light, almost always ceases to scream and becomes perfectly quiet while thus attracted. Seizing this opportunity, the physician should pass his hand under the clothes, and applying it directly over the cutaneous surface, he may first learn by a rapid palpation the general characters of the abdomen, and then ascertain by sudden and decided pressure whether it be abnormally sensitive. If the pressure gives pain the infant will cry out at the moment, while at the same time a sudden contraction of the countenance will assist to show the perception of some painful sensation. Should the infant, on the contrary, continue to gaze fixedly at the light, without noticing the manœuvres of the physician, it is fair to conclude that there is no inflammatory tenderness present.

EXAMINATION OF THE MOUTH AND FAUCES.—In all obscure attacks of sickness occurring in young children, and even in those who have attained to the faculty of speech, the physician ought to be most careful to inspect the condition of the mouth and fauces, since not a few cases of fever which seem at first view inexplicable, are at once made plain by this simple exploration. I was once called to see a child three years of age, who had been sick three days with fever, thought by intelligent and educated parents to depend on gastric derangement. A single look into the throat showed it to be completely clogged up with pseudo-membranous exudations, whilst a slight hiss in the inspiration, and a husky voice, declared that the same fatal product was just entering the larynx. The time for successful action had slipped by; the patient died two days after in the agonies of slow croup. On another occasion I was called to take charge of two children in one family who had been ailing several days with feverish symptoms, loss of appetite, languor, and some complaint of sore throat. In both I found the fauces covered with plastic deposit, and both died a few days after of membranous croup. Some years ago I attended a child between five and six years old, for a period of four days, with irregular fever, some vomiting, total anorexia, languor, indisposition to play, and rare complaints of pain in the *chin and neck*, that were not mentioned to me by the attendants, I having all the time the idea that the attack was one of gastric embarrassment. Greatly to my amazement and consternation, the mother informed me on the fifth day that she had seen something white in the throat. Upon examination I found both tonsils covered with whitish exudation. Happily the disease had not extended beyond those glands, and still more fortunately, it was arrested and cured in two days by the application of a strong lunar caustic solution, and by the administration of some doses of calomel combined with minute quantities of tartar emetic.

In croup, also, in whatever form it may make its attack, the fauces ought to be closely watched, in order to know by the presence or absence of false membrane, the probability or improbability of the case being one of the membranous kind. In scarlatina and measles, especially in the former, the throat ought to be examined each day, to ascertain its precise condition, and particularly to learn whether there be present any disposition to membranous, ulcerative, or gangrenous angina.

In young infants, also, the mouth requires a thorough examination from time to time in all their ailments, and especially in their digestive diseases, since they are liable to thrush, to aphthæ, and in chronic and debilitating maladies, to gangræna oris. In teething children the act of dentition requires that the mouth should be inspected occasionally in order to ascertain the state of that process, and to detect the existence of the form of stomatitis called ulcerative, which generally occurs between the ages of one and five or six years.

The mouth can be readily examined by pressing upon the chin with force sufficient to cause the child to separate the jaws. In the young infant this very generally produces crying, during which the mouth is widely opened, and the state of the cheeks, lips, gums, and tongue can be perfectly well seen. In an older child, who refuses to open the mouth, or to keep it open, the handle of a smooth silver spoon is the best instrument to employ by which to effect our purpose.

The throat cannot be well seen at any age, except by depressing the base of the tongue, which is best done by means of a spoon-handle, as above directed. When a child refuses obstinately to open the mouth, and resists with violent struggles, it should be taken on the lap of a strong assistant, with the back of its trunk resting against the chest of the assistant, whose arms should restrain, by being crossed over the body and limbs of the child, its more vehement movements. Another assistant must hold the head of the child steady, whilst the physician obliges it to open the mouth, either by closing the nostrils with the fingers, or by slowly and gently, but firmly, insinuating the handle of the spoon between the teeth. After the spoon has once been passed over the tongue there is seldom any difficulty in obtaining a good view of the fauces.

The *introduction of the finger into the mouth* is of some use as a diagnostic means in the case of infants. It informs us of the temperature of that cavity, of the state of its secretions, and, consequently, of its dryness or humidity, and of the disposition and ability of the infant to suck. When an infant is in good health, it will almost always seize the finger, when this is placed in the mouth, and suck vigorously for some instants. It will do the same when it is only ailing with some slight malady, and in the early stage of more dangerous diseases. But, in severe and threatening illness, the infant either refuses to suck upon the finger at all, or does so only for an instant. When the mouth is irritated or inflamed, as in the various forms of stomatitis, the child will open the mouth and cry, and make no attempt whatever at suction. In stupor, and especially in coma, but little attention is paid to the finger, the infant being generally unconscious of its presence.

By watching the child when put to the breast, we may acquire nearly the same information as that just referred to, except that the child would naturally make a greater effort to seize the nipple than the finger, and would therefore nurse, even though the act of so doing were painful, under circumstances in which it might refuse to grasp the finger at all. The refusal to nurse, or the nursing but little at a time, may depend on other causes, however, than sore mouth. It often depends on some anginose inflammation. When this is the case, it may be suspected from the peculiar gulping manner in which the child swallows, and from the fact that swallowing often causes fits of coughing. It is caused also by dyspnœa. An infant laboring under severe oppression from pneumonia, bronchitis, or any other cause, never sucks well and steadily, but rather by fits and starts. The nipple is seized often with avidity, and two or three swallows are made in quick succession; then follows a pause to regain the breath, and then again the effort of deglutition. In a few cases attended with very great dyspnœa, that I have seen, the patients have been able to swallow only once or twice without pausing, and even then with very great difficulty.

MANNER OF TAKING DRINKS.—The remarks just made as to the inferences to be drawn from the manner in which the infant sucks, will apply also to the mode in which both infants and older children drink. A young child drinks continuously, without stopping to breathe. If, however, it have any disorder which accelerates the respiration, it will, after drinking a few mouthfuls, cease, jerk its head away from the cup or spoon, breathe irregularly and hurriedly, and cough, These symptoms ought to call attention to the respiratory organs. So, if a child, whose breathing is not oppressed, nevertheless drinks with difficulty, slowly, at intervals, and apparently with pain, there is reason to suspect some impediment in the pharynx, and the fauces ought thereupon to be carefully examined.

We may learn also from the manner of drinking whether the child is thirsty or not. When it drinks often and with avidity, and yet has a dry mouth, it is evident that there is very great thirst.

VOMITING AND THE DISCHARGES BY STOOL.—The physician should never think his examination of a sick child concluded until he has inquired as to the occurrence of vomiting, and as to the state of the discharges by stool. Not only, indeed, should he inquire as to these symptoms, but he ought by all means to inspect personally the appearance of the matters ejected. This is especially important in regard to the dejections; since no description of a mother or nurse, however intelligent, can impart to the physician the precise and accurate idea of the state of those discharges which even a very rapid inspection would give him.

Vomiting is of very frequent occurrence in infancy and childhood. Owing to the fact that the stomach is much less curved in its shape than in the adult, and that the œsophagus enters the organ close to its left extremity, vomiting and regurgitation take place with great readiness, and are, therefore, very common symptoms in the diseases of early life.

The young practitioner must beware lest he regard all kinds of vomiting in the infant as the result of disease. The nursing child is very apt to vomit, even when in the most perfect health, especially if it be suckled at an abundant breast. This kind of vomiting, however, may be readily distinguished from that which depends on some morbid state of the health, by the circumstance of the infant's ejecting nothing but the milk which it has swallowed, either just as it was drawn from the mother, or slightly curdled, and by the fact that it suffers no inconvenience whatever from the act,—neither any violent effort, languor, paleness, nor faintness. And yet I have known a young practitioner to prescribe antacids and absorbents to correct this kind of vomiting, which is most plainly an act of nature kindly intended to rid the infant of any excess of food it may have imbibed.

In older children also, vomiting not unfrequently occurs as a consequence of over-distension of the stomach with food. When, therefore, after vomiting, a child seems relieved and comfortable, when any unpleasant symptoms that may have existed prior to it moderate or disappear afterwards, it is fair to conclude that the act has been beneficial, and wrong to regard it as the signal of a necessity for giving medicine, or for regarding the child as a patient, except insomuch as to watch lest it be sick as an after-consequence of having had the digestive power overtasked.

Frequently repeated vomiting, attended with retching and effort, and with paleness and exhaustion, or with fever, always indicates some considerable derangement of the health. It is impossible to ascertain the precise cause of such vomiting, except by a proper consideration and comparison of all the symptoms the child may present. The cause may be in the stomach itself, consisting of an inflamed state of the organ, or it may be a simple indigestion without any inflammatory condition whatever; it may be that the cause lies in the intestine, being some inflammation, functional disease, or obstruction of that part; it may be pneumonia or pleurisy; it may be the approach of some of the eruptive fevers; or last, and most serious of all, the cause may be some commencing lesion of the brain, which, though as yet determining no proper cerebral symptoms, shall perhaps be destined, by its inevitable progress, to end the patient's life as surely and certainly as if he were struck with that opprobrium of medicine, consumption. The detection of the particular causative condition, in any of these forms of vomiting, can be arrived at only by a careful study of the whole constitution of the patient, both through the rational symptoms that may be present, and by a thorough inspection of the different systems of the body by means of the physical methods of diagnosis.

The rule to examine with his own eyes the napkins or cloths of the child, ought never to be forgotten by the practitioner, when there is any reason to suppose that the alimentary functions are at all deranged. The number of the stools in the twenty-four hours ought also to be ascertained, not loosely and carelessly, but precisely and with certainty. Without a close attention to these two precautions, it is impossible for the physician to obtain really useful and exact notions in regard to the nature of the disorder he is called upon to treat, or to judge of the degree of severity of the attack.

I shall not attempt to consider in this place, either the various unnatural appearances of the matters vomited, or ejected by stool, the amount of those substances, or the frequency with which the discharges take place, since these various circumstances can be treated of in the manner they require, only when we come to study separately the diseases of which they form a part.

I shall here conclude my remarks upon the methods to be pursued in the clinical exploration of the diseases of children. I have only to add the wish that those who shall honor them with their perusal, may find them of some real assistance in their subsequent studies of the affections of early life. They are intended, of course, chiefly for the student and young practitioner; but I cannot help hoping that they may possibly prove useful to some who have spent a longer time in the profession, but who have never, perchance, given any particular attention to the best modes of investigating the diseases of infants and children.

CLASS I.

DISEASES OF THE RESPIRATORY ORGANS.

CHAPTER I.

DISEASES OF THE UPPER AIR-PASSAGES.

SECTION I.

DISEASES OF THE NASAL PASSAGES.

ARTICLE I.

CORYZA.

Definition; Synonymes; Forms; Frequency.—Coryza is inflammation of the mucous membrane lining the nasal passages. It is called in common language, cold in the head, or snuffles. Underwood describes one variety of it under the title of coryza maligna, or morbid snuffles, which, he says, is very different from and a far more serious disorder than what is usually called snuffles. Dewees makes no reference to it. Eberle describes it under the title of coryza. He doubts whether coryza maligna ever occurs in this country, and takes his account chiefly from Underwood and Denman.

I shall describe three forms of the disease,—the simple, or mild, the severe, and the chronic; the severe form includes purulent and pseudo-membranous coryza. Simple coryza is very common at all ages; it occurs frequently as a distinct disorder, but still more frequently in connection with laryngitis, bronchitis, pneumonia, measles, scarlet fever, &c. The severe form of coryza is that which has been called by Underwood coryza maligna, or morbid snuffles. Purulent and pseudo-membranous coryza rarely occur as idiopathic affections, but are almost invariably connected with angina or other diseases. I met with one case, however, of the purulent form, unaccompanied by angina or other disease, in 1841, in a child seven weeks old. The case proved fatal. I saw another fatal case of the same form, connected with simple angina, in 1846, in a child five weeks old. Besides these two cases, I have met with four others of the pseudo-membranous variety, accompanied by simple angina, in children between two and six years of age, all of which terminated favorably. The two varieties of the disease occur, however, as already stated, much the most frequently as secondary affections in the course of other diseases, particularly measles, scarlet fever, pseudo-membranous angina, &c. I shall not attempt in the present article to treat particularly of the cases which accompany the eruptive fevers.

CAUSES.—The only clearly evident cause of simple primary coryza, in most cases, is chilling of the body. Insufficient dress,—a very common error in this country,—too low a temperature of the nursery, and exposure to bad weather, may often be discovered to have been the causes of the attack.

The causes of the disease, in the two cases of purulent coryza above referred to, were unknown. In one the nurse remarked a slight discharge of blood from the nose soon after birth, and the coryza dated from that time. In the other, the patient, a feeble child, was attacked when two weeks old without any appreciable cause. The four cases of the pseudo-membranous form occurred in 1845 and 1846, during an extensive prevalence in this city of severe scarlet fever, measles, and pseudo-membranous angina and laryngitis, which makes it probable that they depended upon the epidemic constitution of the atmosphere. The cases of MM. Rilliet and Barthez coincided generally with primary or secondary purulent or pseudo-membranous angina. From the account given by Underwood of coryza maligna, there can be little doubt that it was epidemic when observed by himself and Denman. The latter author states that in connection with the coryza there was a general fulness of the throat and neck externally; that the tonsils were tumefied, and of a dark red color, with ash-colored specks, and in some cases, with extensive ulcerations; and that some of the children swallowed with difficulty: all of which symptoms clearly point to severe concomitant angina.

ANATOMICAL LESIONS.—The Schneiderian mucous membrane is found reddened uniformly, or in points, rough, thickened, and sometimes softened. When pseudo-membrane is present, it exists either in fragments, or lines the whole extent of the nasal passages, and is mixed with mucus or muco-purulent fluid, in greater or less quantity.

SYMPTOMS.—The symptoms of simple coryza are sneezing, dryness of the nose at first, soon followed by discharge, which is very small in quantity in the beginning, and more abundant afterwards, and more or less disturbance of the respiration. It is only in young infants that this form of coryza is a disorder of any consequence in itself. In older children it never injures the health by its own action; it is of importance merely as the sign that a cold has been taken, and ought to be regarded as a hint given by nature of the necessity of guarding the child more carefully in future. But, in infants at the breast, and very young children, it assumes much greater importance from the very considerable obstacle it opposes to the act of respiration. At this early age, in fact, coryza becomes a serious and even dangerous disease. If primary, it causes great distress and disturbance to the child, interrupting its sleep, interfering with the act of nursing, and, in some instances, so impeding the function of respiration, as to bring on slight, and more rarely, dangerous asphyctic symptoms. It may, undoubtedly, occasion, in weak and debilitated children, more or less extensive collapse of the lungs, an accident which will explain the imperfect performance of the hematosic function in some cases, where the only evident disease is this apparently insignificant one of coryza.

When simple coryza exists in connection with bronchitis and pneumonia, it adds to the severity of those diseases. In children over three or four years old, and particularly in those who are vigorous, it seldom gives any serious trouble. But in young infants, and in weakly children of any age, its influence upon the symptoms is often very marked. The effort to breathe through the nasal passages, when they are partially or wholly occluded by the inflammatory swelling of their lining mucous membrane, or by abundant and viscid secretions, fatigues and wears away the strength of the child, exhausts its energies, and renders it less able to resist the pressure of the sickness. But not only this;—as in primary coryza, the entrance of air into the lungs is impeded, and the hematosic function is thereby interfered with, while at the same time, the existence of an obstacle to the full inspiratory movement, in addition to that which exists in the lungs themselves from bronchial or pneumonic disease, cannot but assist in the production of that collapse of the pulmonary tissue, which has been found of late years to coincide so often with the bronchitis and pneumonia of young children, and especially with the former.

The reason why coryza causes so much difficulty in young children is, that they persist in the effort to breathe through the nose in spite of the obstruction of the nasal passages. They seem to do this instinctively, not, apparently, having the power to carry on the act of respiration through the mouth, or but for short periods only at a time. The constant struggle to force the air through the nose, and the necessarily smaller quantity that reaches the lungs, are undoubtedly the two chief causes of the symptoms above described as occurring in the coryza of children.

SEVERE CORYZA begins with sneezing and stoppage of the nostrils, soon after which the discharge, which is the pathognomonic symptom of the disease, makes its appearance. This consists of serous or mucous fluid in greater or less abundance, usually of a yellowish color, and which, at first thin and without odor, becomes afterwards thicker and often purulent, with a peculiar, unpleasant, but not fetid odor. In other cases, on the contrary, and especially when the pseudo-membranous exudation is present, the discharge is thin, and often contains small granular particles, which seem to be the detritus of the false membrane, while at other times it is ichorous or even bloody. When false membrane is present, it can often be seen, upon examination of the nostrils in a strong light, to cover the mucous membrane in the form of thin adherent layers of a yellowish-white color. The alæ nasi, and sometimes the whole extremity of the nose, are red and swelled, and the skin, which is tense and shining, presents an erysipelatous appearance. The upper lip is generally reddened, irritated, swelled, and sometimes excoriated, by the nasal secretions.

The *respiration* is generally difficult, nasal, and snoring. When the nasal passages are nearly or quite filled with the secretions, the child being no longer able to breathe through them as in health, is compelled to keep the mouth open. This is exceedingly inconvenient to children of all ages, as it causes great dryness and stiffness of that cavity, and of the tongue and throat, and in very young infants, who instinctively respire almost exclusively through the nostrils, it is attended with such violent efforts, as to be a chief or perhaps sole cause of the fatal termination of some cases. In one instance that I saw, the child was seized with attacks of suffocative breathing, which threatened fatal asphyxia, whenever the passages became much impeded. Under these circumstances the cleansing of the passages with a brush would afford complete relief, and, for a time, the little thing would appear to be quite well. Finally, however, death occurred in one of the attacks of dyspnœa, from sudden serous effusion into the lungs. The difficulty of respiration is greater, as I have stated, in proportion as the child is younger, and depends on the physiological fact already referred to, that at a very early age, respiration is performed almost solely through the nostrils, and that the child seems incapable of keeping the mouth upon, in order to compensate for their closure. I have never observed *cough* except in cases accompanied by angina. *Epistaxis* occurred in two cases of the pseudo-membranous form, in children between three and five years of age. The bleeding recurred on several occasions, but ceased so soon as the coryza was cured. Infants refuse the breast when the passages are much clogged, or suckle with great difficulty and at long intervals.

The character of the *general symptoms* depends much more upon the accompanying disease, in older children, than on the coryza itself, and it is unnecessary therefore to dwell upon them. In the two infants observed by myself, the principal symptoms were, in the case unaccompanied by angina, restlessness, weakness, emaciation, dry, harsh, and wrinkled skin, and violent attacks of dyspnœa; and in the other case, in which angina was present, there were added to these, fever and somnolence. The *duration*, as observed by myself, in the two cases occurring in infants, was between two and three weeks, in the one unattended by other disease, and six days in the one accompanied by angina. In the other four cases, which occurred in older children, the duration of the attack depended on the form and degree of the attendant angina. In one case it became chronic, and was accompanied by ulceration of the nasal passages. MM. Rilliet and Barthez state that they saw a child two years old die in three days, and another of three years in the same time; but as one of these cases was complicated with angina and croup, and the other with pseudo-membranous angina, it is clear that the rapid death depended rather on the accompanying disease, than the coryza itself.

The *prognosis* must depend on the age of the child, and the form of the attack. Simple coryza is never dangerous except in very young infants, and rarely in them. When, however, it occurs in a delicate infant, and is accompanied with either sufficient turgescence of the nasal mucous membrane, or with enough viscid secretion, to cause a nearly complete occlusion of the nasal passages, the effort to breathe through the nose, and the diminished quantity of air that reaches the lungs, will sometimes give rise to great and dangerous exhaustion, or to partial or fatal asphyxia. In older children this form of the disease is never scarcely more than an annoyance.

When simple coryza occurs in connection with other diseases, whether thoracic inflammations, angina, or measles, it always adds, and sometimes most seriously, to the difficulties of the patient, since the effort to breathe through the obstructed air-passages must assist to exhaust the life-forces, while at the same time a certain amount of the blood in the lungs, which ought to be exposed at each inhalation to the inspired air, is deprived of this necessary contact by the fact, that less than the natural quantity of air is drawn through the nasal passages at each expansion of the chest.

The purulent and pseudo-membranous forms of coryza are always dangerous, whether they occur alone, or as a part of other diseases. The two cases of idiopathic membranous coryza in infants that came under my observation, both proved fatal. The four cases in older children recovered without any difficulty. When they occur in connection with pseudo-membranous angina, or in the course of scarlet fever, the prognosis will of course depend very much on that of those diseases.

CHRONIC CORYZA.—Under this title I shall describe as succinctly as possible a form of inflammation of the Schneiderian membrane of which I see a good many examples. It is characterized rather by swelling and thickening of the mucous membrane as far as this can be seen, and by an accumulation of scabs and crusts, causing obstruction to the passage of the air, than by a discharge. The secretions are, in fact, not much increased in quantity beyond their natural amount, but they consist of very thick mucus, or they are purulent in character.

I have met with this form of disease generally in children over two years of age, and from that period up to puberty. Its principal *cause* has always seemed to be some faulty state of the general health, some constitutional dyscrasia. Like the keratitis and chronic otorrhœa of children, it makes its appearance without any evident exciting cause whatever, or it follows an acute attack of catarrhal inflammation from cold, or an attack of measles, scarlatina, or epidemic angina. On one occasion, I met with it in three out of a family of four children. Though it is unquestionably very apt to occur in scrofulous children, its presence is not necessarily a sign that the patient is of scrofulous habit, since I have seen it in families in which there was no taint of that disease, and have known a good many of those affected by it to recover perfectly, and show no subsequent symptoms of the scrofulous or tubercular cachexia. Its chief efficient cause appears to be a low state of the general health, the blood being more or less markedly anemical, and the nutrition of the body imperfect.

The chief *symptoms* of this form of disease are of a local character. The breathing is at all times more or less nasal and embarrassed. Even in the waking state, the child will sometimes attract attention by the noisy and slightly oppressed character of its respiration, while when asleep the obstruction to the passage of air through the nasal passages will be so great as to give rise to symptoms which, though not alarming, are most annoying to those around. The obstruction to the passage of air through the nasal passages produces snoring or hissing sounds, which are sometimes so noisy as seriously to disturb those sleeping in the same apartment. This obstruction also obliges the child to make much greater muscular efforts than in the healthy state, to supply the thorax fully with air, so that the sleep, instead of being quiet and easy as in health, is broken and disturbed by the unusual play of the muscles, and by the disordered internal sensations caused by the reaction upon the nervous centres of a circulating fluid less thoroughly decarbonized than it should be. The child tosses and rolls, sighs and moans, or cries out in its sleep, or wakes suddenly and frequently.

When the nasal passages are examined by a full light, they will be seen to be obstructed in two ways: by a thickened and injected state of the mucous membrane, and by the presence in them of scabs, or of more or less inspissated masses of mucus or muco-pus. The mucous membrane is also redder and more highly vascular than natural, and sometimes exhibits an appearance in some points as though excoriated or slightly eroded. There is seldom, indeed rarely, any considerable amount of fluid secretion, as in acute coryza; the secretions are so much more viscid than usual that they desiccate in the passages and form scabs and crusts. Not unfrequently the surfaces become so irritable as to bleed very easily. The act of blowing the nose, a rude touch, or a blow, will cause a considerable discharge of blood, and this is often the symptom for which the practitioner is particularly consulted. The voice of the child is usually characteristic; it is nasal; and when the obstruction is considerable this becomes a marked symptom.

The general appearance of the patient almost always shows a deteriorated state of the general health. His color is too pale; the skin is muddy; the expression is languid; the tissues are more flabby and flaccid than they ought to be; and the movements are less brisk and prompt than in full health. Such patients wake from their sleep less refreshed than is natural; their appetite is often capricious and poor; and the digestive and nutritive functions are impaired. The tongue is often flabby in its texture, pale, and more or less furred, the bowels are irregular, and the discharges often scanty, and of an unhealthy color and smell, or there are alternations of diarrhœa and constipation.

The *duration* of this form of coryza is very indefinite. Under the most patient treatment, it often lasts for many months, and even when cured is very apt to return with or without apparent exciting causes, so that I have known it to last for several years.

TREATMENT.—Simple coryza requires no treatment in children over two years of age, except attention to hygienic conditions. Young children may often be preserved from attacks of spasmodic laryngitis and bronchitis, by calling the attention of the mother to the strong tendency which exists during infancy and childhood to the extension of disease, and advising, in cases of coryza, that the child should be secluded in the house, or else very warmly clothed, if sent out.

In young infants, even the mildest coryza gives trouble, by obstructing the full freedom of the respiratory act, by interfering with the suckling, and by the restless and broken sleep which it induces. In such cases, all the treatment required is to keep the child warm, and to clear the nasal passages, and at the same time lubricate them, by the occasional introduction of a camel's hair pencil charged with glycerine, or sweet oil.

When the coryza is more severe, so as to interfere a good deal with the respiration, it is necessary to make use of the brush frequently, to administer a warm foot-bath once or twice a day, and to give a few drops of syrup of ipecacuanha, with sweet spirits of nitre, every two, three, or four hours. In such cases, my father has been in the habit, for many years past, of directing a flannel cap to be put upon the child, and kept there for two or three days;—a simple, and often most effectual mode of treatment. The cap should be removed after two or three days, so soon as the coryza is relieved, as otherwise the child is apt to become so much accustomed to it, as to take fresh cold when it is removed.

In infants laboring under purulent or pseudo-membranous coryza, the indications of treatment are to remove the secretions as they collect, and to subdue the inflammation of the mucous membrane by which they are produced. The first indication may be fulfilled by means of a brush made of long camel's hair, by throwing water from a small syringe into the nasal passages, or, when the discharges are thin and fluid, by blowing strongly into the nostrils, whilst the tongue is depressed by a finger introduced into the mouth, so as to allow the secretions to pass out of the posterior nares into the fauces.

The second indication is to be fulfilled chiefly by the application of solutions of alum, nitrate of silver, sulphate of zinc or copper, and by insufflations of different substances in powder. The best application is probably the solution of nitrate of silver, which may be made of the strength of five or ten grains to the ounce, or stronger, to be made use of several times a day, with a brush. I have also employed injections consisting of solutions of alum, of from three to six grains to the ounce. It is recommended by MM. Rilliet and Barthez to make insufflations of powdered gum and alum, or of gum and calomel in equal parts, several times a day. There is, however, it seems to me, an objection to this method of treatment, especially in infants, —which is, that the powders would necessarily tend to increase the obstruction which already exists, to breathing through the nose. It has been proposed also to apply a few leeches to the mastoid process, or over the frontal sinuses. This might be done in hearty children.

In the form of the disease accompanied with angina, an essential part of the treatment must be that of the throat-affection. This will be considered in another place.

The treatment of chronic coryza must be twofold: *general* and *local.* The most important points to be attended to in connection with the general treatment are the clothing, the diet, and the administration of tonics and alteratives. The *clothing* ought to be warm during the cold seasons of the year. Flannel, as a general rule, ought to be insisted upon. The arms and neck must be covered, and the legs should never be exposed, after the very mistaken fashion amongst many persons of the present day. The diet ought to be strengthening and nutritious. Fresh meats, milk, bread, and good butter, and the plainer vegetables, ought to be urged upon the child. If necessary, some authority must be made use of by the parents to induce the patient to take a sufficient quantity of these plain, but nutritious articles of food. Pastry, cakes, candies, nuts, hot bread, sweetmeats, and all such rich, but not really substantial diet, should be forbidden to as great an extent as possible.

Of the tonics to be given, the best are the preparations of iron, and cod-liver oil. Of the former, I prefer commonly the syrup of the iodide of iron, from three to five drops, at four or five years of age, three times a day, in half a teaspoonful or a teaspoonful of sarsaparilla syrup. Or the Pulv. Ferri of the pharmacopœia may be given, either in the form of powder, mixed with dry sugar, in pill, or in the shape of the chocolate lozenge. From half a grain to a grain, three times a day, is the proper dose from three or four years to six or seven. The mass of carbonate of iron may be given, if it is preferred, for any cause. Either of these preparations of iron, or any other that may be chosen, should be combined with a grain of quinine three times a day, whenever the appetite is poor, and when the digestive process seems to be slow and feeble. Or the child may be made to take half a teaspoonful of the fluid extract of cinchona, mixed with an equal quantity of syrup of ginger, half an hour before the meals, while the iron is given alone soon after the meals. When the attack is particularly obstinate, and when, also, it occurs in a subject who either inherits or exhibits signs of the tubercular or scrofulous diathesis, the best remedy is cod-liver oil, which should be given in doses of from half a teaspoonful to a teaspoonful two hours after each meal.

The *local treatment* must consist in the use of means intended to keep the passages clean and free from scabs and incrustations, and in the employment of astringent and alterative applications. When the patient will submit, the nasal passages should be cleansed by means of a syringe once or twice a day, with tepid water, or milk and water, or with a weak solution of alum in water. The latter may be made in the proportion of from two to four grains to the ounce. If the discharges are offensive, the lotion used for injection should consist of the solution of chlorinated soda, one, two, or three drachms in two ounces of water. After the use of the syringe, and more or less frequently through the day, according to the disposition to dryness of the surfaces, these should be lubricated with some oleaginous application. One of the best is glycerine, or glycerine rubbed up with cold cream (ʒi of the former to ℥i of the latter); or sweet oil, or oil of sweet almonds, may be used. These applications are best made by means of a camel's hair brush.

Amongst the astringent applications, the best are weak solutions (gr. v to x to water ℥i) of the nitrate of silver, which should be used only once a day, or solutions of the sulphate or acetate of zinc with wine of opium. From two to five grains of either preparation, with a drachm of wine of opium, to an ounce of water, make a proper application. This may be applied twice a day. One of the best means that I know of, however, after the use of the alum or soda injection through the day, is to apply the following ointment at night: R. Ungt. Hydrarg. Nitrat., ʒss; Ex. Belladonnæ, gr. x; Axungiæ, ℥ss.—M. This has succeeded admirably well in several cases in which I have used it. It should be applied, after being completely softened by a gentle heat, on a camel's hair pencil, care being taken to apply it thoroughly to the surface of the mucous membrane itself, and not merely to the outside of the hardened scabs.

Case.—The subject of this case, a male, was born after an easy, natural labor, and appeared strong and well, with the exception of a little discharge of blood from the nose soon after birth and slight coryza, the latter of which continued until the child was five weeks old, when it became aggravated, and my father was requested to visit the infant. I saw it at the same time. It was small and puny; the skin was harsh, dry, and wrinkled, so that the child looked like a little old woman. It was very weak, and had constant secretions from the nostrils of thick, dark-colored pus. When the discharge collected in sufficient quantity to obstruct the passages, the respiration became exceedingly difficult, as the infant seemed incapable of breathing through the mouth. At such moments it seemed as though the child must die of asphyxia. If the nostrils were cleared by any means, by syringing, by the use of a brush, or by blowing into them in the manner already described, the respiration would become easy and natural, until the discharge collected again, when the same scene recurred. During the paroxysms arising from the closure of the nasal passages, the child was entirely unable to take the breast, but after being relieved, had no difficulty whatever; the mouth was either kept shut, or if open, the tongue was observed to be pressed spasmodically against the roof of the mouth, so that it was impossible for more than a very small amount of air to pass over it; the respiration was labored, and accompanied by a loud snoring or nasal sound. There was no other marked symptom, except a nearly constant flatulent distension of the epigastric region. On the day before death, the infant seemed better, appeared to have gained flesh, and looked more intelligent, so that the mother was greatly encouraged; but the next day it was seized during one of the paroxysms of suffocation, which did not seem to be worse than many preceding ones, with copious discharges of bloody and frothy serum from the mouth and nose, and died in about three-quarters of an hour.

At the post-mortem examination we were not allowed to examine the nasal passages or throat. The stomach and bowels were healthy, but much distended with gas. The peritoneum was healthy, but contained a considerable amount of clear yellowish serum. There was serous effusion in both pleural cavities, but no traces of inflammation. The lungs were healthy, with the exception of some ecchymosed points, and general infiltration with sanguineous frothy serum. The trachea and bronchia were natural. The heart was larger than usual, but healthy in other respects.

SECTION II.

DISEASES OF THE LARYNX.

GENERAL REMARKS.

THERE has been much confusion amongst writers on the diseases of children, until within a few years past, in regard to the diseases of the larynx, each one differing from the other in his opinions as to the nature of the several disorders of that organ, and of course as to their classification and symptoms. From later and more rigid observation it has become clear, however, it appears to me, that there are but three diseases of the larynx which deserve to be considered as separate and distinct affections; these are simple, ordinary, erythematous inflammation of the larynx, unattended with spasm of the glottis, or, as that symptom has been emphatically named, laryngismus; simple erythematous inflammation of the larynx, attended with laryngismus, and called most properly spasmodic simple laryngitis, or more commonly simple, false, spasmodic, or catarrhal croup; and lastly, pseudo-membranous inflammation of the larynx, properly named pseudo-membranous laryngitis, and more commonly called true or membranous croup. There is, moreover, another disease, of which one of the most marked symptoms is spasm of the glottis or laryngismus, attended with a hoop or stridor, which is now known by the name of laryngismus stridulus, but which is called also Kopp's or thymic asthma, spasm of the glottis, and croup-like convulsion. This disease has often been confounded with the above-named spasmodic affections of the larynx, under the common title of croup, or has been supposed to constitute a distinct disease of the larynx; whereas now it is well known that the laryngismus whence its name was taken, is but one of many symptoms that mark the dependence of the disease upon disordered action of the reflex portion of the general nervous system.

I am well aware, also, that some most competent observers describe a purely spasmodic affection of the larynx, under the title of spasmodic croup, which they believe to be entirely independent of laryngeal inflammation, and to consist in a mere momentary contraction of the sphincter muscle of the larynx, produced by the sympathies which that part holds with other parts of the body, and especially with the digestive apparatus. As I have never, however, in what has now become a very considerable experience in the diseases of children, met with a case of spasmodic croup unconnected with more or less evident catarrhal condition of the larynx, I am not disposed to risk increasing the confusion already attending this subject, by making additional and more minute varieties of these affections than those above-named. I am quite willing to acknowledge that, in some cases of simple spasmodic croup, the amount of catarrhal inflammation of the larynx is slight, and that the symptoms of digestive disorder are very strongly marked, but in not a single instance of croup that has come under my notice, have I ever had reason to suppose that the croupal symptoms were dependent solely on simple spasm of the glottis (caused by some distant irritation), unattended with inflammation of the laryngeal mucous membrane. In all such cases that I have met with, it has seemed to me that the condition of gastric, intestinal, or bilious disorders, might be explained in one of two ways. Either the disorder of the digestive function has rendered the child unusually susceptible to cold, by having diminished its power of resistance to the weather; or, the derangement of the bodily functions caused by the cold has weakened, amongst others, the digestive system, and thus brought about various symptoms of gastric or intestinal disturbance, or more commonly of indigestion.

ARTICLE I.

SIMPLE LARYNGITIS WITHOUT SPASM.

Definition; Frequency.—This disease consists of simple erythematous inflammation of the mucous membrane of the larynx, unattended with spasmodic closure of the organ. It is sometimes attended with ulceration, but is unaccompanied by exudation of false membrane. The frequency of the disease, during infancy and childhood, is very considerable, so much so, that not a winter passes without my meeting with a good many well-marked cases.

Predisposing Causes.—The disease occurs at all periods of childhood, but seems to be more frequent under than over five years of age. Of sixty-two well-marked primary cases that I have met with in which the age was noted, fifty occurred in children under, and only twelve in those over that age. Of the former class, twelve were under one year, seventeen between one and two, nine between two and three, five between three and four, and five between four and five. Of sixty-four cases in which the sex was noted, thirty-six occurred in boys, and twenty-eight in girls. As to the influence of the seasons, it may be stated that it is by far the most common in the fall, winter, and spring months.

The only *exciting* causes of the disease which appear to have been ascertained with any certainty, are the action of cold, the positive influence of which cannot be questioned; the inspiration of irritating substances, such as gases, smoke, powders floating in the air, etc.; and violent efforts of crying. MM. Rilliet and Barthez state that they have twice known erythematous and ulcerative laryngitis to follow long-continued and violent crying; and M. Billard also cites this as a cause. I am acquainted with one case in which a slight attack of the disease appeared to have been brought on solely by loud and obstinate screaming.

The disease is very apt to occur in the course of other maladies, and particularly of measles, small-pox, scarlet fever, bronchitis, and pneumonia.

Anatomical Lesions.—The anatomical alterations may consist of simple inflammation of the mucous membrane, with its various effects, or of the same changes in connection with ulceration. The latter class of lesions is almost always confined to secondary cases. In the former class, the mucous membrane varies in color between a deep rose and violet-red, which may be either uniform or only in patches. In severer cases, the tissue is at the same time softened or roughened, and sometimes thickened. When redness, softening, and thickening are present, the disease is generally confined to certain parts, and commonly to the epiglottis and internal portions of the vocal cords; but when redness alone exists, it usually affects the whole of the larynx, and sometimes extends to the trachea. In cases attended with ulcerations, these alterations exist in connection with those already described. The ulcerations are generally small, few in number, very superficial, linear in shape, and are almost always found upon the vocal cords. They are so slight often as to escape observation, unless a very careful examination be made; and this, perhaps, explains the circumstance of so few persons having met with them in the simple acute disease.

SYMPTOMS; COURSE; DURATION.—The attack generally begins with an alteration of the *voice or cry*. In infants the change in the cry alone exists, so that to detect the disease, it is necessary to hear the child cry. In older children the same alteration of the cry is present, but there is in addition a change of the voice, consisting of various degrees of hoarseness. These symptoms may be so slight as to be observed in the cry only when it is strong and forcible, and in the voice so as to strike only the ear of one accustomed to be with the child; or they may be so marked as to be heard in the faintest cry that is uttered, and to be evident in the voice in a moment to the most careless observer; or there may be complete aphonia. They are often intermittent in this form, and are generally most marked in the after part of the day and during the night. Simultaneously with this symptom, or very soon after, *cough* occurs. This is generally hoarse and rough, and early in the attack, dry; at a later period it usually becomes loose, and as this change occurs loses its character of hoarseness. The frequency of the cough is variable, but usually moderate; as a general rule it is most frequent in the evening, and early in the morning, particularly in infants and young children. The disease is almost always preceded and attended with some coryza, which, in the early stage, is marked by sneezing and slight incrustations about the nostrils, and at a later period, by mucous and sero-mucous discharges. The *respiration* remains natural, except that it is sometimes nasal, and sometimes a little accelerated. There is rarely any fever, or it is slight, and occurs only at night. There is no pain in the larynx. In some cases, the hoarseness of the cry, voice, or cough scarcely exists, or is but slightly marked, and the only symptom is a dry, hard, teasing, and paroxysmal cough, which, from its sound, evidently proceeds from the larynx, and resembles very much that produced by the tickling of a foreign body in the throat.

The symptoms of this disease, instead of being of the mild character just described, may be much more severe. The cough is more frequent, hoarse, troublesome, and painful, from the scraping and tearing sensations it occasions in the larynx. The voice is more affected, becoming from husky more and more hoarse, though it is very unusual for it to become weak and whispering, as in membranous and severe spasmodic croup. The respiration is decidedly accelerated, giving rise to slight dyspnœa, and there is more or less fever, which is most marked usually in the after part of the day and in the night. The pulse is more frequent than in health, rising to 120 or 130 in the minute; the skin is hot and dry; the child is thirsty, restless, and uncomfortable. After a few days usually, the cough becomes loose and easy, and ceases to be painful; the voice loses its hoarse tone gradually, the fever disappears, the appetite and gaiety return, and the child regains its usual health.

When the laryngeal inflammation becomes violent in this disorder, so as to be attended with considerable swelling of the mucous membrane, the case always, according to my experience, assumes the shape of grave spasmodic laryngitis. To my remarks upon that disorder, in which I shall endeavor to embody what I have learned in regard to violent simple inflammation of the laryngeal mucous membrane in children, I must refer the reader for further information on this point.

In nearly all the cases of this form of laryngitis that have come under my observation, I have found, upon examining the fauces, more or less decided inflammation of the tonsils, soft palate and pharynx. In cases following a rather chronic course, from two to four or six weeks, which are rarely accompanied by fever or hoarseness, except at the invasion, and sometimes in the evening, the pharyngeal mucous membrane presented a roughened, thickened appearance, and the tonsils and uvula were more or less enlarged and tumefied.

There is a form of obstinate, troublesome cough, to which children are subject, and of which I have met with a good many examples, that must be noticed here. It depends evidently upon chronic inflammation, with thickening of the mucous membrane lining the upper portion of the larynx. Of this I feel assured, not from any post-mortem examination, since I have never known a child to die of, or while laboring under the affection, but from the tone and character of the cough, from its occasional association with hoarseness of the voice, from its being almost invariably coincident with thickening and granulation of the pharyngeal mucous membrane, and from the fact that the most careful physical examination of the chest fails to reveal any disease whatever of the lungs. The cough is harsh, rough, and, so to speak, tearing in its character. It often sounds, especially towards evening and in the early part of the night, croupal in its tone. It is usually very frequent, not so much, however, during the day, as in the evening and night. It is very generally increased by the horizontal position, so that when the child is put to bed, he will begin to cough violently and almost incessantly, and will continue to do so for one, two, and even three or four hours. The cough is so constant and so severe as to cause the greatest disturbance not only to the patient, who will toss and turn in bed in the most restless manner, but to the mother or attendants, who are excessively annoyed, and sometimes alarmed, by its constancy and obstinacy. Children who become subject to this species of cough, often have repeated attacks during the cold seasons of the year, the slightest exposure sometimes bringing them on. Each attack may last from a few days to several weeks. In one case I knew it to last, without once entirely ceasing, three months, and in another it lasted, with imperfect suspensions of a few days, during the same length of time. Both these cases occurred in hearty boys, one in the second, and the other in the third year of life, and yet both were vigorous and healthy children, as time has shown. In many other instances, I have known it last two, three, and four weeks, proving all that time most troublesome and rebellious to treatment. During the day, the child generally seems perfectly well, or at most merely a little pale and languid, and he coughs but moderately, but as soon as night comes on, and especially when he is put to bed, the cough begins, and goes on for hours, as stated above, unless some remedy, and particularly some opiate, be given to check it. It is most annoying to the practitioner, for he finds that his usual remedies act merely as palliatives. They check and modify, perhaps overcome it for a time, but the next change in the weather, and especially the least exposure to cold and damp, start it afresh, and he has to resort again to the same round of treatment to subdue it. To the members of the family also it gives great anxiety. At first, they fear it must run into croup, which, however, it very seldom does, and then, finding how difficult it is of cure, and how often it recurs, they can scarcely be persuaded that it does not depend on some serious disease of the lungs.

The principal *cause* of this form of chronic laryngeal irritation is, so far as I have been able to ascertain, an unusual susceptibility of the laryngeal mucous membrane, sometimes the result of a congenital idiosyncrasy, and at other times the result of influences coming into action after birth, and especially of improper dress. I have generally met with it in children dressed upon the hardening system so much in vogue with many of our most highly educated citizens. The low frock, leaving the neck and upper half of the chest exposed to the air, the bare arms and bare legs, persevered in through our cold autumns, winters, and springs, have certainly, in most of my cases, been the cause of this troublesome and chronic cough.

The *duration* of the disease varies according to its form and the circumstances under which it occurs. When primary, it lasts usually from a few days to one or two weeks, but when it becomes chronic, as I have known to happen in a good many instances, it has lasted from two to four or six weeks, and even two and three months. The duration of secondary cases depends, of course, upon that of the disease during which they occur.

DIAGNOSIS.—The diagnosis of simple laryngitis is very easy. The hoarseness of the cry, voice, and cough, the redness of the mucous membrane of the pharynx, and the absence of general symptoms, will distinguish it from any other affection. In somewhat severer cases of this form, in which the cough is more frequent and harassing, the general symptoms more strongly marked, and the respiration somewhat hurried and oppressed, the attack may at first view present the appearances of bronchitis or pneumonia. The absence of the physical signs of these affections will show at once, by negative evidence, the true nature of the case.

In some cases in which there is little or no hoarseness of the voice or cough, the symptoms strongly resemble the early stage of hooping-cough. I have met with five instances, in which it was difficult not to believe, for two and three weeks, that the attack was really one of that disease. In one of these the resemblance was so close, that for several days there was a distinct hoop during the fit of coughing, with vomiting at the close of the paroxysm. The grounds for deciding that the case alluded to was not one of pertussis were, that the attacks came on like laryngitis, after measles, and that the paroxysms occurred only at night. In the other cases a correct diagnosis was arrived at only by attention to the state of the fauces, which are almost always more or less inflamed and thickened in laryngitis, whilst they are not so in pertussis, and by watching the progress of the sickness.

PROGNOSIS.—The prognosis is always favorable in the mild form of the disease. I have never met with a fatal case.

TREATMENT.—The treatment of the milder cases of this form of laryngitis ought to be very simple. Seclusion in a warm room, careful management of the clothing, slight reduction of the diet if there be any fever, a foot-bath at night of simple water, or of water containing a little mustard, the application of some slightly stimulating liniment to the front of the neck and throat twice a day, and the occasional internal administration of some gentle expectorant and anodyne dose, constitute all that is necessary in the great majority of cases of this kind. The best internal remedies are a few drops of syrup of ipecacuanha, with paregoric, laudanum, or solution of morphia, given every evening as the child is put to bed, or occasionally through the day also, if the cough is troublesome. A combination of syrup of seneka with that of ipecacuanha, will often be found very serviceable.

The treatment of the chronic laryngeal cough, unattended by fever or any severe constitutional symptoms, described above, requires some special remarks. In the first place, I have to state that I have seldom succeeded in curing it until I had obtained from the parents their consent (often obtained with great difficulty) to a proper dress for the child. Expectorants, nauseants, opiates, antispasmodics, counter-irritants, and local applications, have nearly always failed to procure more than temporary alleviation, until the child has been dressed warmly. I have cured, on several occasions, this kind of cough, after many ineffectual trials with the above remedies, only by insisting upon a mode of dress which covers the neck, arms, and lower extremities. A merino or soft flannel shirt, with long sleeves and high neck, long merino stockings, and thick muslin or canton-flannel drawers, have done more in such cases to effect a cure than all other means. This style of dress has removed the cause, the constant chilling of the body, and then the usual therapeutic measures will, no doubt, assist in overcoming the local changes which constitute the disease.

The best therapeutic measures to be adopted in such cases are the application, once a day, of a solution of nitrate of silver, of twenty grains to the ounce, low down into the pharynx and chink of the glottis, by means of a small sponge-mop on a bent whalebone. After several applications have been made daily, they should be made only once in two or three days. The most useful internal treatment, in my hands, has been the exhibition, three times a day, of one of the following mixtures, preferring that with antimony for a vigorous child, and that without antimony for one less robust.

℞.—Potass. Carbonat.,	℈i.
Vin. Antimon.,	ʒss vel i.
Tinct. Opii,	gtt. xxiv, vel xlviii.
Syrup. Simp.,	℥i.
Aq. Cinnamom.,	℥ii.—M.
Ft. Mistura.	

℞.—Potass. Carbonat.,	℈i.
Tinct. Opii,	gtt. xxiv, vel xlviii.
Syrup. Senegæ,	ʒii.
Syrup. Tolutani,	ʒvi.
Aq. Fluvial.,	℥ii.—M.
Ft. Mistura.	

When the cough is very harassing at night, from two to four drops of laudanum, with from ten to twenty drops of syrup of ipecacuanha, or two grains of Dover's powder, given once or twice in the evening, have answered better than any other means. When the patient presents an anemical appearance, or other symptoms marking a general deterioration of the health, iron, and especially the syrup of the iodide of iron, given three times a day, has assisted in removing the cough, and especially in lessening the extreme susceptibility of the system to changes of the weather. The diet ought to be light but strengthening. Good fresh meat, with simple nutritious vegetables for dinner, and bread and milk morning and evening, constitute the most proper diet. In bad weather, during the cold seasons of the year, the child should be secluded in the house.

ARTICLE II.

SPASMODIC SIMPLE LARYNGITIS, OR SPASMODIC OR FALSE CROUP.

DEFINITION; SYNONYMES; FREQUENCY; FORMS.—Spasmodic laryngitis is a disease of the larynx almost peculiar to children, consisting of simple ordinary inflammation, without pseudo-membranous exudation, of the mucous membrane of that organ, and attended with spasmodic contraction of the glottis, or laryngismus, occasioning violent attacks of threatened suffocation.

It is the disease commonly called in this country croup, or, by those who make the distinction between it and pseudo-membranous laryngitis or true croup, spasmodic croup. It is known also by the names of false or pseudo-croup. I prefer the term spasmodic laryngitis, because it is expressive of the essential characters of the disease. It is the stridulous laryngitis of MM. Guersent and Valleix; the stridulous angina of M. Bretonneau; the acute asthma of infancy of Millar; and the spasmodic croup of Wichmann, Michaelis, and Double. It is not the laryngismus stridulus described by the English authors, Kerr, Ley, and Marsh, which is the same as the thymic or Kopp's asthma of the Germans, and spasm of the glottis of the French. It is called by Dr. Wood, in his work on the practice of medicine, catarrhal croup.

Spasmodic laryngitis is one of the most *frequent* of the diseases which occur during childhood in this country. It is so common in this city, that almost all mothers who have had any experience in sickness, keep some remedy for it in their houses, which they are in the habit of resorting to upon their own judgment.

During the last eleven years I have had under my charge 109 cases of the disease, of which I have kept an accurate record, and a number of other cases of which I have no written account. Of the 109 cases, 86 were of the mild, and 23 of the severe form.

I shall describe two *forms* or degrees of this disease, the *mild* and the *severe*. Without this distinction it would be impossible to give an accurate account of the disorder, since the cases differ so much in severity as to render them almost as much unlike as though they were two distinct affections. Moreover, while the mild form is widely different from membranous or true croup in many of its most important symptoms, the severe form, on the contrary, resembles it so much as to demand often very nice powers of observation to make the distinction, and yet the distinction between the two forms of simple and membranous croup, is one of very great consequence to the patient, since the prognosis and treatment are widely different in the two diseases.

PREDISPOSING CAUSES.—The disease is much more common at some *ages* than others. It occurs most frequently during the period of the first dentition, being more common in the second year of life, which is the time of greatest activity of the first dentition, than at any other age, though it is often met with also in the third and fourth years. In the fifth year it still occurs occasionally, in the sixth and seventh it becomes rare, and after the seventh I have seen it but once. Of 106 cases of the disease that I have attended, in which the age was noted, 8 occurred in the first year of life, 33 in the second, 22 in the third, 26 in the fourth, 12 in the fifth, 2 in the sixth, 2 in the seventh, and 1 in the eighth.

It is said to be more frequent in boys than girls, and this seems borne out by my own experience, since of 106 cases, 62 occurred in boys, and 44 in girls.

Spasmodic croup occurs usually as a *sporadic* disease, but is said by some authors to prevail at times as an *epidemic.* I have never had any reason to suppose that it was strictly an epidemic like membranous croup, which appears to a considerable extent in some years, and in others is scarcely seen. I believe rather that the unusual prevalence of spasmodic laryngitis at certain periods, in comparison with others, depends on the fact that certain states of the weather or season predispose or excite to it in a greater degree than usual, and thus occasion a large number of children to be attacked with it.

It is generally believed to be hereditary in certain families, and of this I myself have no doubt. I am acquainted with one family in this city, in which the children for three generations were extremely liable to it; with another, in which the grandmother and grandchildren were frequently attacked; and with a third, in which the father and children showed the same predisposition in the most marked manner. The idea is, moreover, entertained by many people in this community.

The natural constitution of the child does not seem to have much influence upon the liability to the disease; it occurs indifferently in the weak and strong. I have no doubt, however, that there are certain transient conditions of the health which do affect the liability to it, since it has long been remarked that disturbances of the digestive functions frequently invite it, and since I have often myself found it most apt to attack those who are liable to it, when they happen to be laboring under bilious disorders or indigestions. It is most common during cold weather.

EXCITING CAUSES.—By far the most frequent exciting cause is the action of cold; either the passage from a warm into a cold atmosphere, or prolonged exposure to cold. It has been known on several occasions to follow long-continued crying, doubtless from inflammatory action set up in the larynx, as a consequence of the excessive determination of blood to that part during the act of crying. I was assured, some time since, by a very intelligent woman, that her little daughter had, at the age of two years, a well-marked attack of croup, after a severe and long-continued fit of crying from some contrariety.

ANATOMICAL LESIONS.—Mild cases of spasmodic laryngitis are so rarely fatal, as to leave us in some doubt as to the character of the anatomical lesions, or whether there are indeed any perceptible alterations of the tissues. I have never myself met with a fatal case of this form, and am therefore unable to give any personal account of the condition of the larynx, though I have never doubted, from the nature of the symptoms, the hoarseness, the dry cough, which afterwards becomes loose, and the whole aspect of the disease, that the anatomical condition of the affected organ must be one of slight inflammatory hyperæmia. In some cases, however, that have been examined, a little mucus in the larynx, and slight redness have been found, while in others no change has been detected. Dr. Wood (*Treat. on the Prac. of Med.*, vol. i, p. 779) accounts for this absence of morbid appearances in the following plausible manner: "In some rare instances, no signs of disease are discovered in the mucous membrane, and the patient has probably died of spasm, consequent upon high vascular irritation or congestion, the marks of which disappear with life."

Cases of severe spasmodic croup have not unfrequently proved fatal, and the anatomical alterations of this form of the disease have therefore been well ascertained. These alterations consist of either simple inflammation of the laryngeal mucous membrane, or of inflammation attended with ulceration. When the inflammation is simple, the membrane is changed in color, either uniformly or in spots, to a deep rose or dark red tint. This may be the only alteration, or the tissue may be found also softened, or roughened and thickened. When the redness, thickening, and softening are all present, these appearances are usually confined to certain parts, and particularly to the epiglottis and vocal cords, but when redness alone is present, it generally affects the whole of the larynx, and may extend to the trachea. To the alterations just described are sometimes added, as was stated above, ulcerations. These are commonly small, few in number, of a linear shape, and are usually seated upon the vocal cords. They are so slight as to escape observation, unless carefully looked for.

SYMPTOMS; DURATION.—The invasion of the *mild form* of spasmodic croup is generally very sudden, for though it is often, perhaps in the majority of cases, preceded for a few hours or a day or two by slight coryza, hoarseness, and cough, these symptoms are seldom noticed at the time, and the child is not supposed to be sick until seized with the paroxysm of suffocation, which is pathognomonic of the disease. This occurs in much the larger number of cases during the night, and very generally wakes the child from sleep. Of sixty-four cases observed by myself, in which the time of the attack was noted, it occurred in the night in sixty-two, whilst in two it came on in the afternoon. The period of the night at which it takes place is very irregular, but it is much more apt to be before than after midnight, as is shown by the fact, that of forty-two cases in which this circumstance was ascertained, the attack was before midnight in thirty, and after in twelve. This agrees very closely with the statement of MM. Rilliet and Barthez, that it has been observed most frequently at eleven in the evening. The duration of the paroxysms varies considerably, and depends a good deal upon the treatment employed. They may last from a few minutes to several hours, but are seldom shorter than from half an hour to an hour. The number of the attacks also varies. In some cases there is but one, though very generally there are several. When the attack occurs early in the night, it is very apt to recur again towards morning, and, unless means of prevention are used, on the following night also, and even, though this happens much more rarely, on the third night. As a general rule, the first attack is the most severe.

When the paroxysm comes on, the child is wakened from sleep by the sudden occurrence of symptoms apparently of the most alarming and dangerous character. These consist of loud, sonorous, and barking cough; of prolonged and labored inspirations, accompanied by a shrill and piercing sound, to which the term stridulous is applied; of rapid and irregular respiration, amounting often to violent dyspnœa, or seemingly impending suffocation: the child, alarmed and terrified at its condition, and at the fright of those around, its countenance expressive of the utmost anxiety, cries violently between the attacks of coughing, and begs to be taken on the lap, or sits up or tosses itself upon the bed, struggling apparently with the disease, which seems for the moment to threaten its very existence. The voice and cry are hoarse, and sometimes almost extinguished during the height of the paroxysms, but become distinctly audible, and often nearly natural, in the intervals between them; differing in this respect from pseudo-membranous croup, in which they remain permanently hoarse or whispering. I have never heard, in this disease, the whispering voice and the short smothered cough of true croup. The face, head, and neck, are at first deeply flushed, and as the paroxysm becomes more violent, assume a dark livid tint, which afterwards passes into a deadly paleness, if the attack be long continued. These changes in the coloration depend upon the arrest of the respiratory function and a consequent partial asphyxia. The pulse is frequent during the paroxysm, and the skin heated. After a longer or shorter period, generally from half an hour to an hour, the respiration becomes more tranquil; the stridulous sound disappears entirely, unless the child be disturbed and made to cry, when it again becomes distinct; the cough is less frequent and less boisterous, and the child generally falls asleep. The attack is very apt to recur towards morning, as has been stated, and if not then, the following night. The patient often seems perfectly well the day after the first paroxysm, with the exception, perhaps, of slight cough.

This is no reason, however, for supposing that the disease will not return in the course of the second night, which is almost sure to happen, unless measures be taken to prevent it. The cough generally continues for a day or two, but soon loses the peculiar character expressed by the term croupal; it becomes less frequent and more loose, and the child is commonly well again in two or three days. Sometimes, however, the cough lasts for several days, becoming gradually less frequent, until at last it ceases entirely.

There is very little fever in mild cases, for though the pulse is accelerated and the skin warm during the paroxysm, these symptoms disappear very soon after that is over. In more severe cases, on the contrary, there may be considerable fever, the pulse becoming frequent and full, and the skin hot. The febrile movement is most apt to occur after the first paroxysm, as a consequence, apparently, of the slight catarrh which remains after the attack.

In the few fatal cases on record, the paroxysms have generally become more frequent and more violent by degrees, and death has occurred from suffocation. In other instances, death has been the result of prostration, which itself has probably depended on imperfect hæmatosis.

Recurrences of the disease are very common, children sometimes having several attacks in a single winter. This is not the case in true croup. I have never known a child to have a second attack of that disease.

The *severe form* of spasmodic laryngitis may begin as such or result from an aggravation of the mild form; or, the case may commence as one of simple laryngitis without spasm of the glottis, and as the intensity and extent of the laryngeal inflammation increase, it may assume all the features of the form under consideration. Whatever be the mode of onset of the case, this form of the disease sets in with hoarse, frequent cough, difficult respiration, restlessness, and more or less violent fever, symptoms which almost always become severe for the first time at night, and usually between early evening and midnight. During the night the symptoms increase in severity; the respiration is frequent and difficult, and, after a time, attended with the stridulous sound in inspiration and expiration caused by narrowing of the glottis; the cough is hoarse, dry, and croupal, and unattended with expectoration; the voice becomes hoarse, and fever sets in, the pulse becoming full and frequent, the skin hot and dry, and the face flushed. These symptoms persist, with greater or less severity, throughout the night, while from time to time, they increase to such an extent as to seem to threaten suffocation, resembling then exactly the paroxysms described as occurring in the mild form of the disease. They usually subside, however, very decidedly towards morning, the breathing becoming easier, the stridulous sound less loud, or ceasing altogether, the fever diminishing, and the patient becoming in all respects much more comfortable. Thisa melioration of the child's condition often continues until towards evening, when the same train of symptoms reappears. In other cases the disease scarcely subsides at all for two, three, or four days, but continues throughout the day and night to exhibit the same symptoms as have been described above. In cases of this kind, which are not at all rare, the disease assumes many of the alarming and dangerous characters of pseudo-membranous laryngitis or true croup, and it becomes very difficult often to distinguish between the two. If no favorable change take place, the dyspnœa becomes so violent as to threaten suffocation; the cough is rare and short; the voice is reduced to a mere whisper; the pulse becomes small, extremely rapid and thready; the countenance, at first livid and congested, assumes a pale, cadaveric appearance; the features are contracted; the child becomes comatose or delirious, and death occurs from slow asphyxia, or sometimes in an attack of general convulsions.

In favorable cases, on the contrary, the dyspnœa, and especially the stridulous sound, diminish; the cough becomes loose, less hoarse, and loses its croupal character; expectoration of mucous sputa takes place in older children, whilst in younger, the loose gurgling sound produced by the discharge of the sputa into the fauces, is heard at the termination of each cough; the voice becomes clearer and stronger; the fever diminishes; the child regains its spirits and disposition to be amused; and soon all dangerous symptoms have disappeared, and the recovery is established.

In nearly all the cases that have come under my observation, I have found, upon examining the fauces, more or less decided inflammation of the tonsils, soft palate, and pharynx.

The *duration* of the *severe form* of spasmodic croup depends on the violence of the attack, and on the mode of treatment. When the treatment is begun with from an early period, the disease is much sooner overcome than when allowed to run on for some time without remedies. In cases of moderate severity, the violence of the symptoms usually subsides after thirty-six or forty-eight hours. In more violent cases, on the contrary, the symptoms seldom subside definitively before the third, fourth, and not unfrequently the fifth day. In no case that has come under my observation, has the disease continued to present dangerous symptoms after the fifth day, unless, as not unfrequently happens, the inflammation spreads to the bronchia or tissue of the lungs, producing bronchitis or pneumonia. But, even after the signs of severe laryngeal inflammation have disappeared, there almost always remains for several days longer, some cough and huskiness of the voice, marking that the mucous membrane of the larynx has not yet regained completely its healthy condition. The disease is said to have proved fatal in twenty-four hours.

NATURE OF THE DISEASE.—Authors hold very different opinions as to the nature of spasmodic laryngitis. By Underwood, Dewees, and Eberle, it is confounded with membranous laryngitis, they making no distinction between false or catarrhal, and true or membranous croup. Dr. Cheyne (*Cyclop. Pract. Med.*, Art. Croup), treats of the two affections as one and the same disease, differing only in their degree of violence. Dr. Copland (*Dict. of Pract. Med.*, Art. Croup), describes spasmodic croup as a variety or modification of true or membranous croup. He supposes that the modifications of true croup are attributable to "the particular part of the air-passages chiefly affected, to the temperament and habit of body of the patient, and the intensity of the causes." It seems to me, however, that these views as to the nature of the two diseases are not correct, and I am induced by personal observation to regard them as distinct affections, which may, in the great majority of cases, be distinguished from each other at a very early stage, by a careful observer. The comparative fatality of the two diseases alone is sufficient to establish a wide difference between them. Thus, of 22 cases of the pseudo-membranous form that I have seen, 10 died; while of 109 cases of the spasmodic form of which I have kept a record, and a considerable number beside, of which I have no notes, not one was fatal. M. Guersent states that of ten cases of the former disease, scarcely two escape; while of upwards of a hundred of the latter that he has seen, not a single one was fatal. (*Dict. de Med.*, t. ix. p. 365.)

The different effects of treatment in the two affections also point to a wide difference in their nature. True croup is almost inevitably fatal, unless attacked at an early period by energetic remedies, as bloodletting, calomel, and emetics, while the mild spasmodic form seldom resists the exhibition of an emetic, a warm bath, or of nauseating doses of ipecacuanha or antimony, and the severe form, though of a most threatening appearance, almost always yields to the proper employment of an efficient antiphlogistic treatment, aided by the use of nauseants and emetics. When we add to these circumstances, the differences in the anatomical alterations in the two diseases, the difference in the mode of invasion, in the cough, voice, cry, fever, duration of the attack, and state of the constitution, all of which will be carefully described in the remarks on diagnosis, I do not see how we can resist the conclusion that they are two distinct disorders, and not, as has generally been asserted by English writers, degrees or modifications of the same.

I believe, therefore, that mild spasmodic laryngitis is a disease consisting in slight inflammation of the mucous membrane of the larynx, attended with violent spasmodic contraction of that organ, or, as that condition has been called of late, laryngismus. The spasm of the laryngeal sphincter seems to be the result of a disordered action of the excito-motory innervations of the part, the irritant, which is productive of the morbid innervation, being, in all probability, the slight inflammation of the laryngeal mucous membrane, which has been already stated to constitute one element of the malady. The nervous element predominates in the early part of the attack, but towards the conclusion, the spasmodic symptoms disappear entirely, and we have left only those which depend on the laryngeal inflammation.

In severe cases of the disease we have the same element of laryngeal spasm, or laryngismus, coincident with, and produced by, a much more intense and dangerous inflammation of the mucous membrane of the part than exists in the mild form.

DIAGNOSIS.—Unquestionably the disease with which spasmodic laryngitis is most likely to be confounded is pseudo-membranous laryngitis, or true croup. There is very little difficulty, however, in distinguishing the mild form of spasmodic croup from true croup, whilst in regard to the severe form, it may be safely stated, that the distinction cannot, in some cases, be made with positive certainty, except by watching the course of the sickness.

Mild cases of spasmodic croup may be distinguished from membranous croup by a comparison of the different symptoms as they arise. The most important of these are: the invasion, in one sudden and almost invariably in the evening or night, in the other, slow and creeping, the paroxysm first occurring indifferently day or night; the cough, in one hoarse and boisterous, in the other hoarse and frequent at first, but rare and smothered towards the end; the voice, in one hoarse, but never scarcely whispering, and if so, only during the height, in the other hoarse at first, and soon permanently whispering or entirely lost; the cry, in one hoarse and stridulous only at the moment of the paroxysm, in the other permanently so; the respiration, in one stridulous and difficult only during the paroxysm, and in the interval perfectly natural, in the other, at first natural, becoming by degrees permanently stridulous, and attended by the most violent dyspnœa, with remarkable prolongation of the expiration; the fever, in one very slight and generally observed only during the nocturnal paroxysm, in the other much more considerable and permanent; and lastly, the duration, in one seldom more than two or three days, in the other rarely less than six, and very often eight or ten days. M. Trousseau states that the *hoarse-sounding*, *croupal* cough, is not a sign of the presence of exudation in the larynx, but rather of its absence; but, "when the cough, croupal at first, becomes less and less frequent, and ends with being nearly insonorous with suffocation, there is true croup, that is to say, with plastic exudation in the larynx." This is precisely my own experience. The rare, insonorous cough of M. Trousseau, is the condition which I have expressed by the term smothered.

In order to render the diagnosis still clearer, I add the following table, which is altered from one given by MM. Rilliet and Barthez.

MILD SPASMODIC LARYNGITIS.	PSEUDO-MEMBRANOUS LARYNGITIS.
Begins with coryza, and hoarse cough, or more frequently with a sudden attack of suffocation in the night. Fauces natural, or merely slight redness, as in simple angina.	In epidemic form, begins as pseudo-membranous angina. In sporadic form, invasion of slight hoarseness for a day or two. There is fever, increase of the hoarseness, with hoarse, croupal cough; in half the cases, pharyngeal exudation, and a little later paroxysms of suffocation.
After the paroxysm, the child seems well; the fever disappears, or is very slight. Voice natural or only slightly hoarse; not whispering.	The fever continues; stridulous respiration; prolonged and difficult expiration; cough hoarse and smothered; voice hoarse and whispering.
If the paroxysm returns, it is during the following night, and it is less severe; the hoarseness disappears; the cough becomes loose and catarrhal.	The dyspnœa and suffocation increase; the voice and cough are smothered or extinguished; stridulous respiration persists.
Duration seldom more than three days.	Duration seldom less than five or six. The hoarseness continues for several weeks.
Very rarely fatal.	Fatal in the majority of the cases.

The only real difficulty in the diagnosis is the distinction between the grave form, and pseudo-membranous laryngitis or true croup unconnected with angina; and this, it would appear from all evidence, cannot in some cases be made with absolute certainty. The only certain and indubitable sign by which to distinguish them, is the presence of false membranes in the expectoration. The existence of this symptom is proof positive of pseudo-membranous disease, but its absence is no proof that the case must be one of simple inflammation; for, even though the membrane has been exuded in large quantities within the larynx, it is not always thrown off by the effort of coughing or vomiting. To show the difficulty of the diagnosis, I will cite the case quoted by M. Valleix (*Loc. cit.* t. i, p. 211) from M. Hache, of a child supposed to be laboring under true croup, who was sent to the Children's Hospital in Paris, in order to have the operation of tracheotomy performed. The absence of false membrane in the expectoration, and a slight remainder of clearness of the voice, occasioned the suspension of the operation. The child died, and no pseudo-membrane whatever was found in the larynx. The only lesions were moderate redness of the mucous membrane, without tumefaction, and without narrowing of the glottis; so that the fatal termination must be ascribed to spasmodic constriction of the glottis, or to tumefaction of that part which had disappeared after death.

Nevertheless, though the diagnosis is difficult, it can generally be made out with considerable certainty by attention to the following points. The pseudo-membranous form of the disease is often preceded or accompanied by the presence of false membranes in the fauces, which is not the case in spasmodic simple laryngitis; the symptoms of invasion of the former disease are less acute than those of the latter, the fever being less violent, and the restlessness and irritability less marked, than is usual in the simple affection, in which the general symptoms are severe from the first. The hoarseness of the voice and cough follow a different course in the two diseases; the progress of these symptoms being slow and gradual in the membranous, and much more rapid in the severe spasmodic form. The fever is violent throughout the attack in the severe spasmodic disease, whilst in the other form it seldom reaches a high degree of intensity. Lastly, the presence of portions of false membrane in the expectoration, in connection with the laryngeal symptoms, affords positive evidence of the existence of true croup.

Of the characters just enumerated as likely to aid us in distinguishing between severe spasmodic and true or membranous croup, I wish to call the reader's attention in greater detail to two, the condition of the voice, and the stridulous respiration. The former is, I have no doubt, much the most important single symptom. In membranous croup, the voice begins by being hoarse, but soon becomes weak, so that after the disease has lasted three or four days, it changes from hoarse to whispering; it becomes, in fact, suppressed. In severe spasmodic croup, the voice is hoarse at first, and becomes more so as the disease goes on, but it very rarely becomes whispering as in true croup, but almost always retains a good volume, so that when urged, the child can speak out loudly. Now this is never the case in the membranous disease, for, as the fibrinous exudation is deposited on the vocal cords and in the ventricles of the larynx, it suspends almost entirely the functions of those parts, and the voice is more or less completely suppressed. The remarks just made in regard to the voice, will apply also to the *cry*, which should be carefully studied in young infants.

The second very important symptom is the stridor. This is, as might be expected, more marked in all its features in true than in false croup, since in the former it depends on a permanent and considerable obstacle to the passage of the air through the larynx. That tube is, in fact, completely coated over upon its internal superficies, with a more or less thick false membrane, which reduces materially its calibre, and impedes to a greater extent, the passage of air, than does the mere inflammatory turgescence and swelling of the mucous membrane of the organ in severe spasmodic croup. On this account, therefore, the stridor in the respiration is louder, shriller, more persistent, more marked in the expiration, and attended with greater effort of the respiratory muscles to overcome the obstacle to the passage of the air in membranous than in severe spasmodic croup.

To conclude, there is in membranous croup, a slow, steady, and unrelenting progression of the symptoms, which is not observed in the spasmodic disease. From hour to hour, from day to day, we can perceive, so to speak, from the gradual and steady march of the disease, that a foreign body in the form of a fibrinous moulding, is being spread slowly over the cavity of the larynx. In severe spasmodic croup, on the contrary, the course of the symptoms is less regular; paroxysms of suffocation occur as in true croup, but when these are over, the child is often quite comfortable; the symptoms indicating a much less considerable permanent mechanical obstruction than in the other affection.

Spasmodic laryngitis may be mistaken also for laryngismus stridulus. The manner in which it is to be distinguished, will be described in the article on that disease.

Prognosis.—Spasmodic simple laryngitis is very rarely a fatal disease. Of its two forms, there can be no doubt that the severe is much more dangerous than the mild, since in the former the patient labors under acute inflammation of the larynx, as well as under spasm of that organ; whilst in the latter, the amount of inflammation is so very slight, as to be of little or no consequence, were it not associated with the laryngismus, which gives to the disorder its most characteristic features.

Of 109 cases of the disease of which I have kept an accurate record, none proved fatal, though 23 of these were of the grave form. I may state also, that I have seen a considerable number of cases of which I have no written account, in none of which was there a fatal termination. I have, therefore, never seen a case of croup without false membrane, prove fatal. That it does sometimes end unfavorably, however, cannot for a moment be questioned. There are various examples of the kind, scattered through the medical journals. MM. Rilliet and Barthez quote in proof of this, two cases from the work of Jurine, in one of which an autopsy was made, and no false membrane discovered. Copland (*Loc. cit.*) remarks that in the few cases of the more purely spasmodic forms that he has had an opportunity of examining, an adhesive glairy fluid with patches of vascularity on the epiglottis and larynx, and a similar fluid in the large bronchi, were the only alterations observed.

Great imminence of danger in any case is shown by a high intensity of the stridulous sound, especially as heard in the expiration; by great severity of the dyspnœa or suffocation; by lividity or extreme paleness of the face; by smallness and rapidity of the pulse; by coldness of the extremities; and by delirium or convulsions.

Treatment.—M. Guersent (*Loc. cit.* p. 367, 368) states that demulcent and mucilaginous drinks, with stimulating hand-baths and foot-baths, are the principal means that ought to be employed in the treatment of spasmodic laryngitis, or pseudo-croup. He proscribes the use of emetics and leeches as unnecessary in most cases, and is of opinion that they have come into general use in the management of the disease, in consequence of its having been generally confounded with true croup. In a paper on croup, by my father, Dr. Charles D. Meigs (*Med. Exam.*, vol. i, p. 398), may be found the following statement in regard to the spasmodic variety: "The croup sound often ceases entirely, and never returns after the exhibition of a small quantity of ipecacuanha, or any other emetic substance, even when no emesis is produced." He says in another place, that "a foot-bath with mustard, and an emetic of ipecacuanha, is in general all that is necessary for the cure."

In giving my own experience in regard to the treatment of this disease, I shall speak first exclusively of the mild, and then of the severe form, since the measures proper and necessary in the one, are very different from those called for in the other.

TREATMENT OF THE MILD FORM; EMETICS.—The great majority of cases will recover perfectly well under the use of emetics employed alone, or in combination with warm baths and revulsives. In cases attended with violent dyspnœa, hoarse cough, and loud stridulous respiration, the emetic should be given until it produces a full effect. In milder cases, in which there is merely loud croupal cough, with an occasional stridulous sound, nauseating doses alone will generally suffice. The most suitable emetic is, as a general rule, ipecacuanha. The best preparation for children is the syrup, of which from twenty to thirty drops may be given to those two years of age, to be repeated every ten or twenty minutes until vomiting is produced; or until the paroxysm is relieved. In very sudden cases, the Syrupus Scillæ Compositus, which is more active in its effects in consequence of the tartar emetic which it contains, might be preferable; about twenty drops of this may be given, and repeated every ten or fifteen minutes, until vomiting or the resolution of the paroxysm is obtained; but, in its employment, care should always be observed not to continue it for too long a time, lest it produce the injurious effects of tartar emetic. When the dyspnœa is very urgent, or when other means fail to produce emesis, I have found nothing so effectual as powdered alum, in doses of a teaspoonful mixed with honey or molasses. (See *Treatment of pseudo-membranous laryngitis.*)

A simple and good method of treating the paroxysm is that recommended by my father, in the paper referred to. It is to direct a small teaspoonful of powdered ipecacuanha to be diffused in a wineglassful of water, of which mixture doses of a teaspoonful are to be given every ten, fifteen, or twenty minutes, according to the urgency of the symptoms. This is a plan of treatment often resorted to by parents in this community, where the disease is so common and so well understood, that there are few mothers who have several children, and who have had some little experience, who do not know how to treat a nocturnal attack of mild spasmodic laryngitis.

After the paroxysm is relieved, it is a good plan to direct five or ten drops of the ipecacuanha syrup to be given every two or three hours during the following day; or, if the child seems perfectly well in the morning, we may begin with these doses in the middle of the day, and continue them until bed-time. By this method, the recurrence of the paroxysm during the second night may, I think, often be prevented, and the cough is rendered free and loose much sooner than when the disorder is left to pursue its natural course.

Baths.—The warm bath is a very prompt and useful remedy in the disease. In all very violent cases, it ought to be resorted to immediately. It should be used also whenever the emetic fails to relieve the urgency of the symptoms, and in cases attended with much disturbance of the circulation. The temperature of the water ought to be about 95° of Fahrenheit, when the child is first immersed, to be raised gradually by the addition of hot water, to 100° or 102°. The child may remain in the bath from ten to twenty minutes.

Bloodletting.—Depletion is rarely necessary in mild spasmodic croup. The only cases that call for it are those in which the symptoms tend to assume the features of the grave form, or of pseudo-membranous croup. Under such circumstances, the method of treatment would be the same as that proper for those affections, to the descriptions of which the reader is referred for further information.

In only two out of the eighty-six cases of this kind that I have noted, was depletion resorted to. One of these occurred in a girl, six months old, who was leeched in front of the larynx, because the action of an emetic and the use of the warm bath had failed to relieve the paroxysm. The child was quite well on the following day. The other case was that of a boy between two and three years of age, who was bled to three ounces on the second night of the attack, on account of the violence and obstinacy of the paroxysm. He was much relieved by the bleeding, and recovered from that time.

Revulsives.—The only revulsives that it can be necessary to employ are mustard foot-baths or mustard poultices applied to the interscapular space; and even these are often needless if the emetic be given. Blisters, which are recommended by some of the French writers, can only be proper in rare cases of the grave form.

Purgatives are required when constipation is present, or when there is so much fever on the second or third day, as to show a considerable amount of laryngeal inflammation. Under the latter circumstances some mild remedy of this class may be resorted to with a view to its evacuant effect. I have never had occasion to employ any of the *mercurials*, and believe them to be unnecessary.

Opium is exceedingly beneficial when the emetic, nauseant, or warm bath have failed to relieve entirely, and when a troublesome croupal cough continues after the spasm has been overcome. Laudanum, paregoric, or solution of morphia, in combination with syrup of ipecacuanha or hive syrup, or

Dover's powder alone, are the most suitable preparations. It is a very good plan to give the child a moderately full dose of the opiate, with ipecacuanha, after the violence of the paroxysm has subsided. It puts the child to sleep, promotes perspiration, softens the cough, and must tend to prevent the return of the spasm. Repeated once or twice early in the second night after the first attack, I believe it often assists materially to avert the recurring nocturnal paroxysm.

TREATMENT OF THE SEVERE FORM.—This form of spasmodic laryngitis or croup demands, on account of the rapidity of its progress, and its dangerous character, a prompt and active treatment. The remedies most to be depended on are bloodletting, calomel, and emetics.

Bloodletting is recommended by most writers. It should be resorted to in obstinate cases, unless contraindicated by the feebleness of the patient, whether this be congenital, or the result of some previous disease. Venesection is preferable to leeching, whenever it can be performed, as the latter annoys, distresses, and fatigues the child, and is often violently resisted. The quantity of blood to be drawn must depend, of course, on the age and strength of the child. About four ounces may be taken from a hearty child of three or four years old. If no visible impression be made upon the disease, the operation may be repeated in six or twelve hours, though I have rarely found it necessary to perform a second bleeding. Still, I should not hesitate to repeat it, were the symptoms to continue unabated, and did the child not seem exhausted by the previous depletion.

Depletion was employed in seven of the twenty-three cases seen by myself. In one, the subject of which was a girl between five and six years of age, the dyspnœa and stridulous respiration, with hoarseness of the voice and cough, continued for thirty-six hours, and were not relieved until the child had been twice bled from the arm to the amount of four ounces each time, and once leeched over the larynx. This case presented, in fact, most of the features of true croup. In another, in a girl of the same age, venesection to four ounces was employed after the symptoms had refused to yield to full vomiting by hive syrup. The third case was that of a boy between one and two years old, who was bled to three ounces. In the four remaining cases, venesection was employed in consequence of the severity of the symptoms, and in all proved very serviceable in controlling the laryngeal obstruction.

Calomel is often necessary so soon as the real nature of the attack is ascertained. Its powerful sedative action upon the circulatory and nervous systems, and its specific influence upon local inflammations attended with increased proportion of fibrine in the blood, as well as experience, indicate the propriety of its employment in this disease. A full dose, from two to four grains, may be given at first, in order to procure its purgative action, after which smaller doses, from a quarter to half a grain every two hours, should be administered with a view of obtaining the aplastic influence of the remedy upon the blood. The last-named doses ought to be continued for one or two days, or until the violence of the attack is evidently abating. I have generally found that the calomel reduces the fever, softens the pulse, diminishes the stridor, and loosens the cough, after having been continued for twelve or twenty-four hours. In one case, that of a child a year and a half old, in whom a very dangerous attack had gone on for four days, unsubdued by bleeding, active emetics, baths, antimony in small doses, and opium, the disease yielded rapidly under the powerful cathartic and sedative operation of four grains of calomel, given in doses of a grain every hour. When the calomel operates too much upon the bowels, it should be combined, if it be necessary to continue its use, with a small quantity of opium, in order to prevent this effect. For some years past, I have been in the habit, both in this disease and in true croup, when the fever was high, of employing the following combination, and, in most instances, have found it a most effectual prescription:

℞.—Hydrarg. Chlor. Mit., . . .	gr. vi.
Antimon. Sulphuret. Præcip., . .	gr. i.
Potass. Nitrat., ...	gr. xii. vel xxiv.—M.

Ft. in chart, no. xii.
Dose, one every two hours.

Emetics are of very great importance in the treatment, though less so, perhaps, than in true croup, in which it is essential to cause the rejection of the false membrane which obstructs the larynx. Yet they are exceedingly useful, and often indispensable, in assisting to expel the viscid mucus secreted within the larynx, and in relaxing, for a time at least, the spasmodic constriction of the glottis, which plays an important part in the production of the distressing dyspnœa and suffocation of the disease. They act probably also by lessening immediately, or through their influence on the circulatory and nervous systems, the inflammation of the larynx. They should be used once or twice, or oftener in the day, according to the degree of dyspnœa, and the effects they produce. For their choice and mode of administration, the reader is referred to the article on true croup.

Purgatives are required merely to keep the bowels soluble; they should be repeated as may be necessary throughout the disease. The most suitable are castor oil, rhubarb, magnesia, or small doses of the powder of jalap combined with calomel.

Expectorants are useful after the violence of the disease has been moderated by more energetic remedies. They may consist of small doses of ipecacuanha, of antimonial wine and sweet spirits of nitre, fractional doses of tartar emetic, decoction of seneka, snake-root, Coxe's hive syrup, or carbonate of potash.

Opiates are often necessary and serviceable in calming excessive restlessness, and in allaying the violence of the suffocative attacks, which depend, in good part, as has been stated, on spasm of the glottis. The most suitable are Dover's powder or some other preparation of opium, or small doses of belladonna, or hyoscyamus.

A warm *bath* at 97° or 98°, employed once or twice a day, and continued for a period of ten or fifteen minutes, often assists greatly in lessening the sufferings of the child, in calming restlessness, and in moderating the heat of skin and violence of the circulation, when the latter symptoms are strongly marked. The same effects may often be obtained by the use of *counter-irritants*, as sinapisms, mustard poultices, mustard foot-baths, &c. *Blisters* are of doubtful propriety in most cases. Nevertheless, I believe that I once saw good effects from the application of a small one over the larynx and trachea.

Hygienic Treatment.—In either form of the disease the child should be placed for the time in a warm room, and warmly clothed. If old enough, it ought to be kept as much as possible in bed during the paroxysm. If so young as to prefer the lap of the nurse, it should be clothed in a long loose wrapper in addition to its usual night-dress. It is very important to confine the child for one or two days after the occurrence of the nocturnal paroxysms to a warm room, in order to prevent, if possible, an attack on the second or third nights. The diet must be simple and of easy digestion, so long as there is any disposition to recurrence of the disease. It may consist of preparations of milk, of bread, rice, or of thin chicken or mutton water. Meat and most vegetables had better be avoided, until the convalescence is fairly established.

Prophylactic Treatment.—It is certain that much may be done by a wise attention to physical education, to prevent attacks of the disease in children who show a liability to it. I would strongly recommend, with this view, attention to the following advice given by M. Guersent, who says (*Loc. cit.* p. 381): "It is possible, to a certain extent, to prevent attacks of pseudo-croup, if we fortify the constitutions of children, by exposing them well clothed to a dry and elastic atmosphere, particularly if they can be kept in constant movement. But of all the precautions which have been found unquestionably advantageous, that which seems most useful is to make them sleep in well-ventilated, dry, carefully closed chambers, having a southern exposure, and always without fire. I have several times been convinced of the utility of this habit in families the children of which were subject to this kind of catarrh."

There can be no doubt that the style of dress used for children in this country, must occasion many and repeated attacks of croup which might just as well have been avoided. The custom is to dress children between the ages of one and four or five years, in such a way as to expose to the air, the whole of the neck and the upper half of the thorax (for the dresses are made so low and loose at the shoulders, as to leave the upper part of the chest virtually uncovered). The arms are left bare, as are also the legs from the knee, or above the knee, to the ankle, so that very nearly half of the cutaneous surface is without covering, and this, too, in the very same rooms and temperature in which sit the parents with the body and limbs warmly clothed to resist our climate, at all seasons changeable and uncertain, and in the winter, very cold. I am perfectly well convinced that this faulty and unreasonable system of dress, which is chosen because it is the fashion, or in order to *harden* the child, who, however, invariably puts on warm clothing when it comes to years of discretion, will explain in part the enormously greater frequency in children than in adults, of the various diseases of the air-passages and lungs produced by cold.

One of the most important means of prevention, therefore, is the adoption of a suitable dress. In winter this should consist of one that shall cover the body completely. If the child be at all delicate, it ought to wear next to the skin a woollen jacket with long sleeves, and covering the chest to the neck. Over this should be put a long-sleeved stout muslin dress, or one of some light woollen material, made in the same style. In young children, the stockings ought to be of wool, and should reach to the knees; in older ones, they may be shorter, but the legs should be covered with drawers made of canton flannel, of thick cotton stuff, or of light woollen flannel. To show the influence of dress, Dr. Eberle mentions the fact that in the country, and especially amongst the Germans, who cover the neck and breast, croup is a very rare disease. During a practice of six years amongst that class of people, he met with only one case of the disease.

When the liability to the disease continues after the completion of the first dentition, I have found the daily use of the cold bath, in connection always with warm clothing, most useful in preventing the attacks. The bath must be commenced with in the summer, and persevered in through the following winter. The water, after the cold weather begins, should be drawn in the evening, allowed to stand all night in a room in which there is a fire through the day, and made use of on the following day. Prepared in this way, I have found the water in the morning at a temperature of between 50° and 60° F. The child ought to be kept in the water only half a minute or a minute, then well rubbed, and dressed immediately.

When the child is pale, weak, and feeble, and unable to bear exposure to the outer air, it may generally be restored to much better health by careful attention to diet, and by the steady and long-continued use of some tonic remedy. The diet ought to consist of bread and milk, and of meat and the simpler vegetables, as potatoes and rice. The tonics most generally suitable are quinine or iron. Of the quinine a grain may be given in pill or solution, twice or three times a day, while at dinner or lunch, or at both, the child should be made to drink from a dessert to a tablespoonful of port wine, mixed with water. This method ought to be steadily persevered in for from three to six weeks or longer. If quinine be objectionable for any reason iron must be substituted. The best preparations are the iodide or the metallic iron.

ARTICLE III.

PSEUDO-MEMBRANOUS LARYNGITIS, OR MEMBRANOUS OR TRUE CROUP.

DEFINITION; SYNONYMES; FREQUENCY.—Pseudo-membranous laryngitis is an acute inflammation of the mucous membrane of the larynx, attended with exudation of false membrane.

It is the croup of the French writers, while, in this country, it is called by the various names of slow, creeping, true, membranous, or inflammatory croup. The term given above seems most suitable, as expressive of the real nature and seat of the disease, and I shall therefore make use of it in contradistinction to that of spasmodic laryngitis or spasmodic or false croup, which is a much more common and less dangerous form of disease.

The frequency of the disease is very considerable. During the five years from 1844 to 1848 inclusive, there occurred in this city 3376 deaths, under fifteen years of age, from bronchitis, croup, pneumonia, hooping-cough, consumption, and other diseases of the respiratory organs. Of this number, 756 were from croup alone; and as spasmodic croup is seldom a fatal disease, it is reasonable to conclude that much the larger number of deaths returned as from croup, were, in fact, caused by the disease now under consideration. It is rare, however, in comparison with spasmodic laryngitis. During the last thirteen years I have met with 22 cases of pseudo-membranous laryngitis, or true croup, in which the disease either attacked the larynx primarily, or followed pseudo-membranous angina. During the same period of time, I have seen 109 cases of spasmodic laryngitis, or croup, of which I have kept a faithful record, and a considerable number of cases besides, of which I have no written account.

PREDISPOSING CAUSES—AGE.—The disease is most frequent between the ages of two and seven years. Of the 22 cases that I have seen, 18 occurred between two and seven years of age, while of the remaining 4 one occurred at the age of eighteen months, 1 at that of nineteen months, and 2 at that of eleven years. As to *sex*, it is said to be more frequent in boys than girls. A feeble and delicate *constitution* is thought by some to be a powerful predisposing cause, but this is at the least very doubtful. Of the 22 cases referred to, all but three occurred in healthy, vigorous children, and these three were neither very weak nor very sickly, but presented a rather more delicate appearance than usual. *Season* appears to exert some influence as a cause, since the disease is apt to be most prevalent in spring and autumn. It is either sporadic or epidemic, resembling in this respect pseudo-membranous angina. When epidemic it is very generally connected with angina, while the sporadic cases frequently begin in the larynx, and often run their course without implicating the pharynx. During the latter part of the year 1844, the whole of 1845, and a part of 1846, the disease prevailed extensively in this city, and was in many cases accompanied by the pharyngeal affection. During those years, and particularly in 1845, measles and scarlatina also prevailed to a great extent, especially the former.

Is it *contagious?* In the article on pseudo-membranous angina, it will be stated that some of the most distinguished authorities unhesitatingly pronounce that disease contagious. In regard to the one under consideration, more doubt is expressed, and both M. Valleix and MM. Rilliet and Barthez say, that additional facts are necessary to determine this point. My own experience has never given me any reason to suppose that it is propagated by contagion, except when connected with pseudo-membranous angina, as I have known it extend from one child to others in the same family only in that class of cases.

The *exciting causes* are but little understood. The only ones which seem to have been ascertained with any certainty, are the application of irritating agents to the laryngeal mucous membrane, and exposure to cold; and even these are questioned by the most accurate observers. In none of the cases that I have seen, could the exciting cause be even suspected.

ANATOMICAL LESIONS.—The false membrane may cover the whole mucous membrane of the larynx, and extend into the pharynx, trachea, and bronchia; or it may be confined to the larynx, either forming a complete lining to the cavity of that organ, or consisting merely of patches of various sizes, with intervals of mucous membrane between destitute of exudation.

It is important to ascertain the proportion of cases in which the deposit extends into the bronchia, and those in which it remains limited to the larynx, or larynx and trachea, as the determination of this point has a strong bearing upon the question of the propriety of the operation of tracheotomy. It appears from a table given by M. Guersent (*Dict. de Médecine*, t. ix, p. 346), containing the results of cases collected by M. Hussenot, from various sources, and of autopsies made by M. Bretonneau, numbering in all one hundred and seventy-one, that in seventy-eight the membrane did not extend beyond the trachea, and that in forty-two it invaded the bronchia; in thirty, the condition of the bronchia was not mentioned; and in twenty-one, there were no false membranes;—so that of one hundred and twenty cases, in which the extent of the false membrane was accurately noted, it was confined to the larynx and trachea in seventy-eight, and extended into the bronchia only in forty-two. In about two-thirds of the cases, therefore, the exudation was confined to the larynx and trachea, which nearly agrees with my own experience in this city, since of seven cases, in which I ascertained with exactitude (five by autopsy, and two by tracheotomy) the extent of the deposit, it passed into the bronchia in three.

The proportion of cases in which the pharynx is implicated is also important, since it affects the diagnosis of the disease. Dr. West reports eleven cases of idiopathic croup, in only two of which there was any formation of false membrane upon the velum and tonsils. Of nineteen cases observed by myself, in which the condition of the throat was recorded, the croup followed membranous angina in eleven; in five, the disease began in the larynx, but was attended at a later period with small deposits upon the tonsils; and in three there was no deposit on the throat at any time.

The false membrane is commonly of a yellowish-white color, and from a fifth of a line to a line in thickness. Its consistence is generally considerable, and it is usually somewhat elastic. The free surface is usually covered with puriform mucus, while the inner surface is adherent with various degrees of force to the mucous membrane beneath. It consists, according to Hasse, mainly of fibrine blended with mucus in various proportions. (*Patholog. Anat. Syden. Soc. Edition*, p. 278.)

The mucous membrane presents various shades of redness, or it is purplish, or even blackish. In other cases it retains its normal characters, a circumstance which has given rise to the opinion entertained by some persons, that the disease is not inflammatory, though it is altogether probable that this condition is consecutive to the formation of the exudation. The membrane is sometimes brittle, friable, and thickened, and in rare instances softened.

Bronchitis and pneumonia are frequent complications of the disease; the other organs are healthy in the great majority of cases, with the exception of venous congestion.

In the secondary croup of measles the appearances are very similar to those observed in primary cases, while in that of scarlet fever the exudation differs in being less consistent and less uniformly spread over the diseased part. In the last-named malady the membrane is thinner, less adherent, and softer, and in some cases puriform, soft, and of a grayish color. It is usually poor in fibrine and prone to decomposition. The mucous membrane is generally discolored and softened.

SYMPTOMS.—It is highly important to ascertain in what proportion of cases the disease begins in the larynx, and in what in the pharynx. It is difficult, however, to determine this question in the present state of knowledge upon the subject, as it has not been carefully examined by a sufficient number of observers. MM. Rilliet and Barthez state that a majority of the cases observed by themselves, and of those of M. Hache also, commenced in the larynx. M. Guersent, on the contrary (*Dict. de Méd.*, t. ix, p. 339), asserts that in nineteen-twentieths of the cases, it begins in the pharynx, and I have heard some physicians in this city assert that the diagnosis between this disease and common or spasmodic croup, cannot be considered as positive during life, unless the pharynx contains an appreciable amount of pseudo-membranous exudation. From this I differ, and believe, on the contrary, that the disease may attack the larynx without at all implicating the pharynx, while, in a considerable number of cases, the pharyngeal complication is exceedingly slight. Of the twenty-two cases that I have seen, the disease followed membranous angina in eleven; it began in the larynx, but was accompanied in the after-part of the case with exudation upon the fauces, in five; in three there was no deposit in the fauces at any period of the disease; and lastly, in three, the state of the throat was not recorded. The membrane was present in the fauces in only two out of eleven cases of idiopathic croup mentioned by Dr. West; so that it is evident that the presence of exudation upon the tonsils is not necessary to make the diagnosis positive. It is probable that the disease is most apt to begin in the pharynx in epidemic cases, while in those which are sporadic, it not unfrequently begins in the larynx.

When the disease begins in the pharynx the early symptoms are the same as those of pseudo-membranous angina. After a longer or shorter period, from one to seven days usually, according to the nature of the epidemic, the malady extends into the larynx, causing cough and hoarseness, and then follows the same course as when it commences in that organ. When, on the contrary, it begins in the larynx, the invasion is marked by hoarseness of the voice, and hoarse, croupal cough, which often continue for one, two, or three days, until the disease has made considerable progress, before the parents deem it necessary to send for a physician. In one case that came under my observation, the child was playing about the room at a time when he had hoarse, whispering voice and cough, and stridulous respiration. In another I was not called until the evening of the third day, though the child had had stridulous cough and respiration for two nights, but, as he always seemed better in the morning, it was not thought necessary to send for me until after he had become violently ill. In a third there was hoarseness of the voice and slight croupal cough during the afternoon of one day and the ensuing night, and the next morning fully developed croup, with fibrinous patches on each tonsil.

These symptoms are not generally accompanied by fever at first. The appetite is usually unimpaired, the thirst scarcely augmented, and the child, though somewhat dull and languid, is disposed to be amused at times. In other and severer cases, on the contrary, the disease becomes aggravated much more rapidly, and may soon lead to a fatal termination.

The change of the *voice* is the first symptom observed in the cases which begin in the larynx. It was always described to me as hoarse, like that which is heard in an ordinary cold. As the disease progresses, the voice becomes more and more hoarse and difficult, until at length it is reduced to a mere whisper. The degree of the hoarseness varies, however, to a very great degree in the same case, the diversities depending probably upon the amount of the spasm of the larynx at the moment, and upon the state of the exudation. I have several times observed the voice to become much stronger and clearer after the operation of an emetic, in consequence no doubt of its relaxing effect upon the glottis. The *cough* is peculiar. At first slightly hoarse, it becomes, as the case goes on, very hoarse and hollow, and then short and smothered. It is variable in frequency, and is apt to occur in paroxysms, which are often very troublesome from their frequent recurrence. Towards the termination of the disease in fatal cases, or whenever the case is very severe, it is altogether different in character from what it was at the beginning, becoming short, instantaneous, and smothered, so that it might very well be called whispering. As the disease progresses, it is accompanied by stridulous respiration, in which a hoarse, rough, hissing, or crowing sound is produced by the rush of the air through the constricted larynx. This sound is usually heard at first only during forced inspirations, and is therefore noticed first during the long inspiration which precedes coughing. Next it is heard during the violent respiratory movements which accompany the act of crying; and as the larynx becomes more and more clogged with the exudation, it occurs during both inspiration and expiration, in every act of respiration, and is so loud as to be heard over the whole room, or even in adjoining rooms.

The *respiration* is natural in the early part of the attack, but as the voice and cough assume their characteristic features, and the stridulous sound is established, it becomes more frequent, rising to 28, 32, 40, and 48, in the minute. At first easy and natural, it becomes, during the height of the symptoms, and especially in fatal cases, the most frightful dyspnœa I have seen in any disease. Every movement of inspiration requires the whole force of the inspiratory muscles to lift the walls of the chest, and enable the air to find its way through the narrow and obstructed glottis; each expiration, instead of being short and easy, as in health, and in nearly all other diseased conditions, requires a slow and laborious contraction of the expiratory muscles to expel from the lungs the air which they contain, and which hisses through the larynx with a sound nearly as loud as that produced during inspiration. The dyspnœa just described is for the most part constant, but exhibits paroxysmal aggravations from time to time.

When a paroxysm of dyspnœa occurs, the expression of the child is that of the most terrible anxiety, or of the wildest terror. In one instance, the face became deeply red, then blue, livid, and finally pale and white, and for a moment life seemed extinct. In the other cases, in which the dyspnœa was constant, the face was of a dusky red color, the expression anxious and haggard, and the child either laid on its side with the head thrown far backwards in a state of somnolence or was constantly changing its position, from restlessness, without noticing anything around it.

There is no *expectoration* early in the disease, or it consists of white or yellowish viscous mucus. At a later period, there is usually expectoration of false membrane, sometimes in the form of a complete tube, or much more frequently, of small irregular fragments, mixed with mucus, or with the matters ejected from the stomach by vomiting. To detect the membrane, the substances expectorated or vomited ought to be placed in water, when the former detaches itself from the mucus and other matters, and is easily recognized. It is not voided in all the cases in which it is known to be present in the larynx. Thus, of the twenty-two cases observed by myself, it was expelled by vomiting or coughing in nine; in eleven, none was rejected, though its presence in each case was proved by the character of the symptoms and by its existence in the fauces, by autopsy, or by the operation of tracheotomy; in one there was expectoration of masses of viscid, yellowish fibrine, though none of membrane; and in one there was no positive evidence of its existence. M. Valleix (*Guide du Méd. Prat.*, tome i, p. 330) states that of fifty-one cases, in which the symptoms were very carefully observed, no traces of the exudation could be discovered either in the expectoration or in the matters rejected by vomiting in twenty-six, though its existence was proved by post-mortem examination.

Auscultation.—In the severe cases of true croup that have come under my notice, auscultation has been of little or no aid to me. In fact, the chest sounds have been, in most cases, so completely masked by the loud shrillness of the laryngeal stridor, that I have been unable to judge with any satisfaction to myself of the condition of the lungs. It has been impossible to determine whether the inability to detect natural respiratory murmur depended on the small volume of air that found its way through the obstructed larynx, or on the fact that all sound was masked by the stridor. This is particularly unfortunate, since, were it not for this circumstance, we might be able to judge by auscultation of the extent to which the bronchia may have been invaded by the false membrane,—a matter very important to determine, when the question of tracheotomy comes to be mooted in a case.

In cases in which the laryngeal obstruction is not very great, and the stridulous sound consequently less loud, we may auscult the chest to some profit. The vesicular murmur is then either natural, or altered according to the state of the lung.

But, though such has been my own experience in regard to auscultation in croup, MM. Barth and Roger (*Trait. Prat. d'Auscultation*, 2d ed., p.

255 and 261) describe, as a sign of croup with floating false membrane, a kind of vibrating murmur, or *tremblotement*, as though a movable membranous veil were agitated by the respired air, and which can be heard when the stethoscope is applied over the larynx or trachea. If this sound be heard only in the larynx, and not in the trachea and bronchia, it indicates the plastic exudation to be of small extent, and likely to be rejected by expectoration, and the prognosis is favorable. In the other case, on the contrary, it shows the disease to be of considerable extent, and the prognosis becomes much more serious.

There is a slight *febrile movement* at the onset, or a day or two after the appearance of the earliest symptoms. When the disease is fully established, the fever becomes violent. The pulse rises to 130, 140, 160, or even higher; it is generally regular and strong at first, but as the case progresses, becomes small, feeble, and very rapid. In one of the paroxysms that I witnessed, it became so rapid that it could not be counted, and at last ceased to beat at either wrist for a few instants. The heat and dryness of the skin are very moderate at first, but increase as the disease reaches its maximum, to diminish afterwards gradually, and in fatal cases, to be replaced by coldness, with copious clammy perspirations. The strength is not diminished at first, but as the disease progresses, becomes more or less so in proportion to the violence and duration of the case. The *digestive organs* are but little disturbed by the influence of the disease, with the exception of diminution or loss of appetite, and moderate thirst, during the violent period. Spontaneous vomiting or diarrhœa are rare, though both sometimes occur. The tongue is moist, and generally covered with yellowish-white fur. Pain in front of the larynx has been noticed by several authors. I have never observed it.

Tumefaction of the submaxillary glands, which is a frequent symptom of pseudo-membranous angina, ought always to be sought for, and when present, lends additional support to the diagnosis.

The mode of recovery in favorable cases is different in different instances. In some it is sudden, taking place rapidly and steadily after the expectoration of a tubular-shaped membrane. The rejection of the deposit in this form, is, however, a rare event, and is not always followed by recovery. I have seen in this city three distinct tubules of false membrane, which were thrown from the larynx of the same child at intervals of two days each. The first was the largest, and came evidently from the whole length of the larynx and trachea; the second was somewhat shorter, and the third not more than half so long as the first. The child was greatly relieved for some hours on each occasion of the rejection of a tubule, but then became more oppressed as the exudation again collected. It sank from exhaustion after the third came away.

As a general rule, the recovery is slow and gradual. After free vomiting, after the expectoration of fragments of false membrane mixed with mucus, or, as happened to myself in two cases, after the expectoration of masses of tough yellowish fibrine, or, lastly, after the rejection of mucoid and frothy sputa only, the symptoms gradually ameliorate: the stridulous respiration slowly subsides, and at last disappears; the cough, which was short, hoarse, and smothered, became louder, stronger, less hoarse, and what is still more favorable, loose; the aphonia moderates, but very slowly; the fever disappears; appetite and gaiety return; and after a variable length of time, the child enters into full convalescence. The hoarseness of voice very generally continues for several days after all the other symptoms have lost their dangerous character, and sometimes lasts for weeks. In one case, the voice was still weak and hoarse on the tenth day, and in another during the seventh week. (*See a paper on croup, by the author, Am. Jour. Med. Sci. April,* 1847.)

Duration.—Death has been known to occur on the first, second, and third days, but such cases are rare. The duration of the disease may be stated at from three to thirteen days, as its most common term. The cases seen by myself, lasted from five to fourteen days.

Diagnosis.—The diagnosis of true croup presents no difficulties, when it follows pseudo-membranous angina. But when, on the contrary, the disease begins in the larynx, and especially when there is no exudation whatever in the fauces, the diagnosis becomes more embarrassing, since, under these circumstances, there are two other laryngeal affections with which true croup may be confounded,—to wit, false croup or spasmodic laryngitis, and laryngismus stridulus. The mode of distinguishing between the different disorders, has been carefully described in the remarks on diagnosis, under the head of the former disease. I wish in this place merely to call the attention of the reader, and particularly of the young practitioner, to the extreme importance of the differential diagnosis between the disease now under consideration, and false or spasmodic croup, since the former is one of the most dangerous and frightful disorders to which children are subject, demanding vigorous and active treatment from the start, at which period only, is medical treatment likely to be successful; whilst the latter, though of a much more threatening aspect at the beginning, is in fact a mild and safe disease in comparison, and one rarely requiring other than very simple treatment.

Prognosis.—Pseudo-membranous laryngitis is a very fatal disease. It is particularly fatal in cases which occur during seasons of epidemic prevalence of the disease, as under these circumstances, it very generally follows membranous angina, itself a severe and dangerous disorder. When the disease occurs in a sporadic form, it is somewhat less dangerous, though it ought at all times, and in all shapes, to arouse the utmost caution of the practitioner. MM. Rilliet and Barthez state that its common termination is in death. M. Valleix says that, "to speak in general terms, it is fatal when not treated energetically." M. Guersent (*Loc. cit.*, p. 365), after a careful consideration of the statements of different authors, says: "In fact, true croup is one of the most dangerous of all diseases, and is generally fatal." He adds that he has seen at least a hundred cases of spasmodic croup, without a single death, while of ten children attacked with true croup, it is scarcely possible to save two. The degree of mortality is very strikingly different in different epidemics. Thus, of sixty cases observed by M. Ferrand in the villages about La Chapelle-Véronge, not a single one escaped (*Dict. de Méd.*, t. ix, p. 364, 399). Other writers speak of having cured three or four in forty, and others nearly all. Dr. Bard, of New York, says that of sixteen cases, seven died. Of the twenty-two cases that I have seen ten died. Of the twenty-two, twelve followed pseudo-membranous angina, of which six died. The remaining ten began in the larynx, and of these, four died, and six recovered. It is clear, therefore, that the disease is less dangerous when it begins in the larynx, than when it follows membranous angina.

The danger is great in proportion as the child is younger and more feeble, and in proportion to the rapidity of the case and the degree of the dyspnœa. The most unfavorable symptoms are: loud stridulous sound heard both in the inspiration and expiration; laborious and prolonged expiration; whispering voice or complete aphonia; congestion of the face and neck; somnolence; weak, rapid, and irregular pulse; cold extremities; and cold clammy perspirations. The favorable symptoms are: expectoration of false membrane; diminution of the stridulous respiration; the change from whispering to hoarseness or to clearness of the voice; looseness of the cough; moderation of the fever; improvement of the temper and moral state; and amelioration of the general condition.

The case should not be abandoned as hopeless until life is actually extinct. I myself saw a child recover after momentary suspension of animation, by asphyxia, on two occasions, though these attacks were followed by a dreadful illness of two days. (*See paper by the author, Loc. cit.*)

TREATMENT.—I am desirous, at the beginning of my remarks upon the treatment of this disease, to express the opinion, that none is *likely* to succeed, unless it be applied early in the case, and by this I mean, in the course of the first, or at the latest, second day. And not only should it be commenced early, but the most active remedies ought to be applied at this period, in their full force. The very moment there is good reason to suppose that a case will prove to be one of membranous croup, the most energetic means ought to be brought to bear upon it, and if this be done from the first, or even second day, I cannot but hope that a considerably larger proportion of recoveries may take place, than has heretofore been thought possible. Of thirteen cases treated in the manner I shall recommend, from a very early period of the attack, ten recovered, though one of the recoveries, let it be observed, was obtained only by the operation of tracheotomy, so that but nine of the ten recoveries are to be ascribed to the medical means employed. Of nine cases not treated in the mode referred to, only two recovered, and in one of these, the patient was rescued from death by tracheotomy. Of the latter cases, I saw three in consultation, late in the attacks, two on the third, and one on the fifth day, when the disease had already made most disastrous progress, one on the tenth day, when the mouth was already bluish from venous congestion, and the other two several years since, before I fully understood the importance of early and energetic treatment.

In the study of the treatment, it will be necessary to rely chiefly upon the works that have been published since the distinction between the two forms of croup has been correctly drawn, for it is impossible to place much dependence on the assertions of previous writers, inasmuch as their opinions in regard to the effects of treatment must have been formed from indiscriminate experience in two very opposite maladies. It is only necessary to recollect the enormous difference in the mortality of the two affections, to be convinced that the success of any plan of treatment in the one, is no fair argument for its probable success in the other. Thus M. Guersent has seen a hundred cases of spasmodic laryngitis, without a single death; while he believes that of ten cases of pseudo-membranous disease, scarcely two can be saved. I have myself attended and kept a record of one hundred and nine cases of spasmodic croup, and have seen a considerable number of cases besides, of which I have no notes, without a single death; whilst of twenty-two cases of true croup that I have met with, ten proved fatal. The most important objects to be held in view in the treatment, are the following: to prevent, if this be at all possible, the formation of false membrane; after its production, to cause its dissolution, or render it less adherent; to provoke its expectoration; to prevent its reproduction after it is once expelled; to subdue the inflammatory diathesis which exists; and to allay the painful symptoms.

Bloodletting.—Many authors award to bloodletting the first place in importance amongst the remedial means in our possession, and it seems to be regarded by many in this country as an indispensable agent in the cure. Moreover, there are not a few who believe that, when promptly and boldly resorted to, it will seldom fail in arresting the disease. Underwood says (*Bell's Ed.*, p. 273): "Bleeding is always necessary, if the physician be called at the commencement of the disease, or stridulous noise; and if the patient be visited too late to endure this evacuation, I believe no hope can remain of his being benefited without it, unless the infant be very young; which, however, in another view, cannot but add to the danger." Dewees recommends it very highly in fully developed cases attended with fever, and advises that it be repeated if the symptoms persist. Eberle says (*Dis.*

of Child., p. 356): "Without doubt, however, the remedy upon which our principal reliance should be placed, for the removal of the tracheal inflammation is bloodletting." Unfortunately for us, the value of the opinions just quoted is very much diminished by the fact that the authors who emit them have not clearly distinguished between the two varieties of the disease, so that their experience is derived in part at least from the effects of the remedy in spasmodic croup; and, as it is now well known that that disease is very readily cured in the vast majority of cases, it is easy to understand the confidence they express in the utility of any means they may have employed.

But if we examine the works of those who have made the distinction between the two diseases, we shall find different opinions from the above expressed in regard to the efficacy of bloodletting.

M. Guersent (*Loc. cit.*, p. 373) asserts that bleeding has not the power of arresting the progress of this specific inflammation,—that the disease continues with greater or less rapidity under the influence of general and local bleedings, and almost always terminates fatally, though the detractions of blood may have been pushed to the utmost limit. M. Bretonneau is of opinion that it has no effect in preventing the formation of the false membrane. M. Valleix (*Loc. cit.*, p. 353) says: "From the examination of a large number of cases, I am convinced, with M. Bretonneau, that bleeding, whether general or local, is not a powerful curative means, and that it does not obviously arrest the progress of the disease." MM. Rilliet and Barthez (T. i., p. 252) are of opinion that bloodletting ought to be resorted to only in vigorous children, in the early part of the attack in sporadic cases, and in those in which the febrile reaction is violent, and the suffocative symptoms strongly marked; while it should be abstained from in epidemic and adynamic cases, in young, pale, and lymphatic children, when the fever is slight and the dyspnœa moderate, and lastly, that it ought never to be employed in the advanced stages of the disease. Dr. Wood (*Treatise on the Prac. of Med.*, vol. i. p. 788), in his remarks on the treatment of the disease, says: "Depletion, in this variety of croup, is much less efficient than in the catarrhal." He adds that the utmost to be expected from it is that it may moderate the severity of the inflammation, and thus probably diminish the amount of the effusion.

I proceed now to state the results of my own experience as to its effects. It was employed in three of the eleven cases which began as angina; in one a venesection, and in the second a venesection and leeching were employed, and both of these recovered; in the third, leeches were used, and the case ended fatally; in none could I perceive that the depletion exerted any positive control over the symptoms of the disease. In the eight remaining cases of this class no bloodletting was made use of, and of these five proved fatal.

Of ten cases in which the disease appeared to begin in the larynx, depletion was used in all. The ages of the subjects were as follows: one, eighteen months; two, two years; four, three years; two, between four and five years; and one, six. Eight of the ten were bled from the arm, and two leeched on the neck. In two of those bled, leeches were also applied to the neck. A single venesection of four ounces was employed in seven, while in two, a venesection of about the same amount was performed three times in each. Of the ten cases, six recovered and four died, but in one of the favorable cases no credit is due to the depletion, since the child was saved only by the operation of tracheotomy. The two cases bled to the largest amount (three times each) recovered. In one of these there were small patches of fibrine on each tonsil, and rejection of false membrane by coughing and vomiting.

The immediate effect of bleeding was decidedly more beneficial in the second series of cases than in those following angina; it caused diminution of the fever and dyspnœa. In none, however, was the relief from bleeding so great as that which followed the full operation of an emetic, and be it remarked, that emetics were freely employed in all.

Emetics.—Emetics are recommended by all writers, and are generally acknowledged to be amongst the most, if not the most, efficient, of all the means employed. M. Valleix (*Loc. cit.*, t. i, p. 358) has demonstrated their importance more fully than any other writer. He states that of fifty-three cases of the disease, tartar emetic and ipecacuanha were chiefly relied on in thirty-one, of which fifteen were cured; whilst of the twenty-two others in which they were parsimoniously given, not a single one recovered. He gives other facts in regard to these cases which are highly interesting and important. Thus, of the thirty-one cases treated with powerful emetics, false membrane was rejected during the efforts of vomiting in twenty-six, and of these fifteen, or nearly three-fifths recovered. In the five others of the thirty-one, on the contrary, no membrane was expelled, and they all terminated fatally. Again, of the twenty-two cases in which emetics formed but a secondary part of the treatment, two rejected false membrane, and of these one recovered; while of the twenty others in which no false membrane was expelled, not one escaped.

My own experience in regard to emetics has been as follows: they were administered frequently and in full doses in seven of the eleven cases which began with angina; in three they were employed to a moderate extent, and in one not at all. Of the seven cases in which they were fully administered, six recovered, but, as in one of these life was saved only by tracheotomy, the success cannot be attributed to the emetics. The four cases in which the emetic plan was not pushed ended fatally. False membrane was rejected in five out of the seven cases above referred to. In one of the five the quantity rejected was very small, and this was the case in which the child was ultimately saved by the operation.

Of ten cases in which the disease began in the larynx, emetics were energetically used, and frequently employed, in eight. Of the eight, five recovered. In four of the eight cases, fragments of false membrane were rejected, and in a fifth, a mass of viscid, yellowish fibrine (this case was marked as one of unquestionable membranous croup, by patches of false membrane on the tonsils). Of these five, four recovered. In three of the eight, no false membrane was rejected, and of these two died. In two of the ten cases, they were not freely used, being employed in one only as a secondary means, and in the other only at the very termination of the attack, as I was not called to the case until the tenth day, the patient having been under homœopathic treatment before. The first of these two cases proved fatal, and the second was rescued from impending death only by the operation of tracheotomy.

These statements and facts are quite sufficient to show that emetics exert a most powerful and beneficial influence on the disease, and that they ought, therefore, to enter into the treatment as principal remedies.

The emetics generally employed in Europe and this country are tartar emetic and ipecacuanha, which are given in the usual doses to produce full vomiting. Neither of these, but especially the former, do I like so well as one which, so far as I know, was first recommended by my father. I refer to the alumen of the pharmacopœia. In an article published by my father in the Med. Examiner (vol. i, p. 414, 1838), he says he has been "accustomed to make use of an emetic, which, so far as I can learn, is very little employed, but which, from the certainty and the speediness of its operation, ought to be more generally admitted into the list of available medicines for this particular case at least. I have been familiar with its effects for more than twenty years, and my confidence in them increases rather than diminishes by time." He adds, "I think that I have never given more than two doses without causing very full vomiting; but I have often large quantities of antimonial wine and ipecacuanha, without succeeding in exciting the efforts of the stomach."

The alum is given in powder, in the dose of a teaspoonful, mixed in honey or syrup, to be repeated every ten or fifteen minutes until it operates. It is not generally necessary to give a second dose, as one operates in the majority of cases very soon after being taken. I have known it to fail to produce vomiting only in two instances, both of which were fatal cases. In one the disease had gone so far before I was called, that no remedy had any effect upon the stomach. In the other, it was administered several times with full success, but lost its effect at last, as had happened also in regard to antimony and ipecacuanha. The reasons for which I prefer alum to antimony, or ipecacuanha, are the following: antimony, when resorted to as frequently in the disease as I am of opinion that emetics ought to be, is too violent in its action; it prostrates many children to a dangerous degree, and is, I fear, in some cases, itself one cause of death. It acts injuriously upon the gastro-intestinal mucous membrane, when used in large quantities, and for any considerable length of time. Again, it is very apt to lose its effect, and to fail to produce sickness. Ipecacuanha is a much safer remedy than tartar emetic, but its operation is often too mild, and it not unfrequently fails to produce any effect after it has been used several times. The advantages of the alum are that it is certain and rapid in its action, and that it operates without producing exhaustion or prostration beyond that which always follows the mere act of vomiting. It does not tend like antimony, and in a less degree ipecacuanha, to produce adynamia of the nervous system; an effect which, in some constitutions or states of the constitution, or when it has been exhibited frequently, is often attended with injurious or even dangerous consequences. I have given alum in the dose above mentioned, every four or five hours, for two and three days, without observing any bad effects to result from it. The alum was given in all the cases that I have seen, in which emetics were used, and was usually the only one employed when it was found to produce full vomiting. In one of the cases accompanied by violent angina, ipecacuanha was substituted because of its smaller bulk. I have already said that it failed to produce vomiting only in two instances. It was the emetic employed in the nine cases in which fragments of false membrane were rejected, and in that in which the yellow viscid fibrine was expelled. Although it did not occasion the rejection of membrane in the other cases, it operated most speedily and efficiently.

Sulphate of copper has been highly recommended by several writers for its emetic operation, and by some of the German physicians, as exerting a specific influence upon the disease in addition to its emetic effect. As an emetic it may be given to a child two or three years old, in the dose of from half a grain to a grain every fifteen minutes, until it operates. To obtain its specific action it is continued afterwards in doses of a quarter of a grain every two hours.

There is another remedy which has been proposed as an emetic by Dr. Hubbard, of Hallowell, Maine. This is the turpeth mineral, the subsulphate or yellow sulphate of mercury, the hydrarg. sulphas flavus of the American pharmacopœia. Dr. Hubbard recommends it on the grounds of promptness and certainty, of its never producing catharsis, and lastly of its not being followed by prostration like that occasioned by tartar emetic. The dose is two or three grains for a child two years old, to be repeated every ten or fifteen minutes, until it operates. He says that if the first dose fails, the second usually acts as soon as it reaches the stomach. I have made trial of this remedy in two cases. The first was one in which alum and tartar emetic had lost their power from frequent repetition. The dyspnœa was intense, and as I believed that the only chance of escape for the child was the operation of an emetic, I proposed the subsulphate. The age of the child was three years. Three grains diffused in syrup were administered. It operated powerfully within a few minutes, and when I saw the patient one hour after, the distressing symptoms were considerably ameliorated. The improvement did not last, however; the child died in a state of exhaustion very soon after. The other case was that of a boy nine years of age, in whom the alum had operated fully, but as it failed to dislodge the membrane, and his situation was desperate if not relieved, I made trial of the turpeth mineral. Six grains were given in two doses, at fifteen minutes interval, but they produced no effect whatever. The case terminated fatally, and the whole larynx and trachea were found filled with a thick membrane.

I conclude these protracted remarks upon emetics with the statement, that from what I have read and from personal experience, I am induced to regard them as the most important remedies we have to oppose to this fearful malady. The emetic, whichever it may be, ought to be given at least three or four times in the twenty-four hours; and in severe cases, once in every four or five hours. The exact periods and frequency of the administration must be determined by the stage and urgency of the symptoms, and by the constitution and present strength of the patient.

Mercury.—Dr. Samuel Bard states that Dr. Douglas, of Boston, who published in the year 1736 an account of the angina suffocativa, was the first to recommend the employment of mercury in the disease. Bard says that he was induced to try mercurials after reading Dr. Douglas's little essay, and adds, "the more freely I have used them, the better effects I have seen from them." He gave calomel in the quantity of thirty or forty grains in five or six days, to children three or four years old; "not only without any ill effects, but to the manifest advantage of my patient; relieving the difficulty of breathing, and promoting the casting off the slough beyond any other medicine." He recommends that the first one or two doses be combined with an opiate. He considers mercury as the basis of the cure.

Since it has been so highly recommended by American practitioners, mercury has been extensively employed and relied on by European physicians. M. Bretonneau gave it in large doses, and MM. Rilliet and Barthez recommend it in the same way. M. Valleix, on the contrary, doubts whether there are any cases of true croup on record, cured by calomel alone.

Calomel was freely given in thirteen of the twenty-two cases seen by myself. Of the thirteen cases, nine recovered, and four died. Of the nine cases in which it was not so used, six died. It ought to be observed, however, that one of the nine recoveries under the free use of calomel was obtained by tracheotomy, though even here the beneficial effects of calomel were most manifest, since this was the only one of three cases that occurred in the same family, in which the exudation remained limited to the larynx and trachea, whilst in the other two calomel was not employed until late in the attack, and then not freely, and in both the deposit extended deeply into the bronchia, and caused a fatal termination. It was doubtless this limited extent of the membrane, in the former case, that allowed the operation of tracheotomy to succeed, whilst it failed, as might have been expected, could the extent of the deposit have been known beforehand, in one of the two other cases last mentioned in which it was performed. I wish to state, also, that one of the three favorable cases of the series in which calomel was not largely employed, was clearly an instance of rescue by tracheotomy, since the patient was rapidly approaching death when the operation was performed.

The most important point in regard to the use of mercury in slow croup, and indeed of bloodletting and emetics also, is that the treatment should be commenced at an early period. It ought to be given early, in order to produce upon the blood its defibrinizing effect, and thus prevent, or at least limit, the extension of the deposit. When begun with after the second or third day, it is very questionable whether it will be of much service, for, by that time, the membrane is already forming in the air-passages or is already deposited there, and it is too late to obtain the constitutional effects of the remedy.

Calomel is the preparation almost always preferred. The doses proposed by different writers vary considerably, some giving it in large and frequently repeated doses, and others in much smaller quantities. I have usually given to children of one or two years old, from half a grain to a grain, and to those of five or six years of age, or upwards, from one to two grains, every two hours. When the symptoms are very urgent, the doses may be repeated every hour, for three or four hours, and an emetic of alum then administered. If the child be very restless, or if the calomel purge much, it is best to combine with each dose a small quantity of Dover's powder.

The whole amount to be given in any case will vary, of course, according to its severity and duration. The largest quantity exhibited in any one of my cases, was between forty and fifty grains; the smallest, six. In most of the cases the quantity varied between fifteen and thirty grains.

The administration of calomel in large doses, has not been followed by bad consequences in any case in which I have used it. Nevertheless, it has been known to produce gangrene of the mouth and necrosis of the maxillary bones, and the practitioner cannot be too careful to suspend it as soon as may be consistent with safety. I never administer it in this way, therefore, without first informing the parents of the possible danger to which it exposes the child, and asking their consent to its employment.

Cauterization of the Fauces and Larynx.—The application of astringent and caustic remedies to the fauces, is of great importance in all cases beginning simultaneously in the pharynx and larynx. In membranous angina, the use of these remedies constitutes one of the most essential points in the treatment, but of this a full account will be given in the article on that disease. In all cases of true croup, however, whether attended with fibrinous deposit in the fauces or not, I believe it will be found useful to employ the nitrate of silver as a local application to the pharynx, and low down over the chink of the larynx. I have made use of solutions of different strength, from five to forty grains to the ounce, and prefer, on the whole, one of about twenty grains. This should be applied low down into the pharynx, so as to touch the epiglottis, by means of a mop made of a small piece of soft sponge fastened upon a bent whalebone. The application is to be repeated once or twice a day, according to the violence of the symptoms, and the effects of the remedy.

It will be found, upon reference to some of the later works on diseases of children, that writers differ very much in regard to the strength of the solution of nitrate of silver employed by them. M. Bouchut, for instance (*Trait. Prat. des Mal. des Nouv.-Nés*, 2ème ed. 1852, p. 315), recommends the solution employed by M. Trousseau, containing one part of the salt to three of distilled water (ten grammes to thirty grammes). This is applied at least twice, and sometimes three or four times in the twenty-four hours, by means of a small sponge on a bent whalebone. The sponge is wetted, then slightly squeezed, and conveyed into the pharynx and upon the glottis, so that "a few drops of the caustic liquid may penetrate into the larynx." M. Bouchut remarks that the treatment has its disadvantages, as "immediate suffocation may be the consequence, should the sponge be left too long upon the glottis, and should too large a quantity of the liquid enter the glottis." The way to avoid this result is to squeeze the sponge slightly so that it may not contain too much of the liquid before applying it, and then to practise the cauterization rapidly, in order not to fill the larynx or œsophagus, as M. Bouchut once saw happen to an inexperienced practitioner. M. Bouchut reports three cases of recovery by this treatment in connection with emetics, but says not a word as to failures. For my own part, I can only say that I have as yet seen nothing in practice that would tempt me to use so powerful a solution as the one just mentioned, especially when, as M. Bouchut says, it might be followed by instant suffocation.

Dr. Horace Green, of New York, proposed, in 1849, the application of a nitrate of silver solution into the interior of the larynx, and in a second edition of his work (*Observations on the Pathology of Croup*, &c., New York, 1852), recommends the same treatment. The solution he employs generally is one of forty grains of the pure crystal, to an ounce of distilled water. The instrument made use of is a probang formed of a piece of fine sponge not exceeding one-third or half an inch in diameter, attached firmly to the end of a rod of whalebone, about ten inches in length, and slightly curved at one end. The sponge is lightly saturated with the solution, and the head of the child being firmly held by an assistant, and the base of the tongue depressed by the handle of a spoon, "the operator carries the wet sponge quickly over the top of the epiglottis, and on the laryngeal face of this cartilage; then, passing it suddenly downwards and forwards, passes it through the opening of the glottis, into the laryngeal cavity." (*Loc. cit.*, p. 84.) Dr. Green recommends that the aperture of the larynx should not be passed until after the parts in the faucial and pharyngeal region have been prepared by having had the solution applied a few times. It is said that after this has been done, the instrument may be passed into the larynx, without producing half the amount of irritation its introduction below the epiglottis would have awakened without these preparatory steps.

I have never resorted to this treatment myself, and can therefore give no personal opinion in regard to its feasibility or efficacy. The practicability of the operation cannot now, however, be doubted, since it has been performed not only by its author, but by a number of other persons, amongst whom I may mention Dr. Charles West, of London. Dr. West, in his second edition (*Diseases of Children*, p. 258), states that he has employed it but once, "though that case quite satisfied me of the possibility of cauterizing the interior of the larynx, and even of the absence of any considerable difficulty in accomplishing it." As to the results of the treatment, it may well be supposed, that it has not been employed by a sufficient number of persons, or in a sufficient number of cases, to determine satisfactorily what we are to expect from it. Dr. Green reports nine cases treated by himself, of which six recovered—a very remarkable success. All of these appear to have been instances of membranous croup, except perhaps two, case No. 5, of which few details are given, and case No. 8, both of which, from their sudden onset, and sudden recovery, seem to me to have been rather attacks of spasmodic or catarrhal, than of membranous croup. Dr. John Ware, of Boston, in an essay on croup (Boston, 1850, p. 27), reports two cases in which he made use of this treatment. The sponge, wet with a solution of the nitrate of silver, was introduced into the larynx morning and evening. "It decidedly gave relief to the breathing soon after each application, and both cases ultimately recovered perfectly."

I have already referred to the strength of the solution advised by M. Trousseau, and to that employed by Dr. Green. Dr. West, I am glad to find, prefers one of about a scruple to the ounce, which agrees with the one I have generally made use of.

In addition to the remedies already mentioned, there are some which are supported by high authority at home or abroad. Amongst them are the sulphuret of potassium, polygala seneka, and different alkaline preparations, especially the carbonate of potash. There is much difference of opinion amongst French writers as to the merits of the sulphuret of potassium, some praising it highly, while others deny it all efficacy. I have never used it, and can therefore have no opinion of my own in regard to its utility. As to the carbonate of potash and seneka, they may be useful as adjuvants, but they ought never to take the place of emetics and mercurials; for, as time, above all things, is precious in this disease, we should never use feeble remedies, to the exclusion of those which are generally acknowledged to be more powerful.

Revulsives often prove useful in allaying restlessness and moderating the violence of the suffocative attacks. Sinapisms and mustard poultices, applied upon various parts of the cutaneous surface, and mustard foot-baths, are amongst the best. The warm bath is often highly beneficial in the same way. Blisters are sometimes used, but flying sinapisms are preferable.

Antispasmodics are recommended, and are doubtless useful in some cases. The best in the world is, in most cases, the operation of an emetic. Opium, or some of its preparations, should always be given in small doses, combined with the calomel, when the patient suffers from severe laryngismus. It assists greatly in alleviating suffering, and in diminishing the asphyctic symptoms caused by the laryngismus. It is an important element in the treatment.

HYGIENIC TREATMENT.—The child ought to be warmly clothed and confined to bed. The diet should consist only of the mildest fluids during the violence of the attack. If the patient become weak and feeble, milk, pure or mixed with water, may be allowed, or light broths may be given. Towards the termination of favorable cases, the diet must be improved slowly and cautiously. If great prostration occur, the powers of the constitution must be supported by stimulants and tonics, as wine whey, milk punch, and quinine.

SUMMARY OF THE TREATMENT.—My own conclusions in regard to the treatment are, that bloodletting is a valuable remedy, when resorted to in proper cases, and at the proper moment. In the form which begins as angina, and which is generally epidemic, it ought to be used with more caution than in that which commences as laryngitis. In the latter form, which is usually sporadic, it may be used freely, especially in vigorous and hearty children.

I will suggest the following plan of treatment to be pursued in vigorous children of two or more years of age, when we are called in good time: to take from the arm three or four ounces of blood once or twice in the first day or two days, according to the strength of the child, and the degree and obstinacy of the fever; to give emetics (and I would recommend alum in preference to any other) once in every four or five hours, so as to produce vomiting attended with a good deal of effort; to give at the same time from one to two grains of calomel with a quarter or half a grain of Dover's powder, every two hours, taking care not to give a dose for an hour before, nor after the time selected for the exhibition of the emetic. In cases in which there is loud stridulous respiration, heard both in the inspiration and expiration, in which previous treatment has had no effect, and in which there is threatening of speedy death, we may give two grains of calomel every hour, until three or four doses have been taken, and direct the exhibition of an alum emetic, after the last dose, or resort to tracheotomy.

Thirteen of the twenty-two cases observed by myself were fairly treated by the mixed method just described. Of the thirteen, three died, and ten recovered. One I saw with Dr. Rutter, of this city, one with Dr. H. H. Smith, two with my father, and nine I attended myself. One of the thirteen was not, however, cured by these means. This was the case already mentioned in the remarks upon mercury, as seeming to show that the medical treatment had restricted the exudation to the larynx and trachea, and thus prepared the child for a favorable termination of the operation of tracheotomy, though the remedies had failed to remove the disease from the upper air-passages.

TRACHEOTOMY.

The operation of tracheotomy would be apt to suggest itself to a medical man, on his witnessing the closing symptoms of croup, as the very means most likely to afford to the patient relief from the dreadful sufferings under which he labors, and a possible rescue from impending death. It has accordingly been often resorted to in different parts of the world, at various stages of the disease, but with results that have led to very different conclusions. In England, for example, it has been of late years almost universally abandoned. Dr. Williams (*Lib. Pract. Med.*, vol. ii, p. 256) is opposed to the operation, because of its dangers, of the few chances of success it affords, and because "it has been decidedly negatived by Dr. Cheyne, Mr. Porter, and other of the best authorities." He states that, "in general it can scarcely be said that the performance of the operation is justifiable." Mr. Porter (*Surg. Obs. on the Larynx and Trachea*, p. 64) says, "I have known and heard of it often, but never understood that it produced a recovery." Mr. Ryland (*Dis. of Larynx*, p. 159) remarks: "With regard to the general results of tracheotomy, when performed for the cure of croup, I have no hesitation in saying that they are so unfavorable as to warrant us in the strongest condemnation of it under almost every conceivable circumstance." Dr. Charles West (*Dis. of Infancy and Childhood*, 2d edition, London, p. 253) hesitates in expressing a decided opinion against tracheotomy, and does not join at present "in the unqualified condemnation of the operation in cases of croup, which has been pronounced by the greater number and the most weighty of English authorities."

In a paper on tracheotomy in croup by Mr. Henry Smith (*Lond. Med. Times and Gazette*, for January 26th, 1856, p. 86), that writer states that he read a paper on this subject before the London Medical Society, in the spring of 1853, when "a very large number of the Fellows were present, and earnestly and warmly discussed the question, as to whether the operation was justifiable or otherwise. Although my own experience of it had extended over several cases, all of which were unsuccessful, the opinion arrived at by the majority of the speakers was, that the operation was justifiable." He goes on to say that the result of this discussion, and a remarkably successful operation in an adult suffering under an allied affection, induced him to give further trial to the operation in several succeeding instances to which he was called. "The result, however, of the proceeding in cases of pure croup, has been disheartening, not one recovery having taken place; and doubts have arisen in my own mind of late, as to whether the surgeon is justified in performing a very severe and dangerous operation, when the results are so unfortunate." He then refers to the paper by M. Trousseau, published in March, 1855, by which it appears that the success of that surgeon has of late been much greater than ever before, and supposes that there must be some difference between the croup of Paris and London, to explain the difference of success in the two cities. He next speaks of having performed the operation in cases of badly obstructed respiration from severe faucial inflammation and tumefaction in scarlet fever, with or without croupy deposit, and concludes by saying: "If, however, it be clearly ascertained that the lungs are sound, that the morbid appearances are fully developed about the fauces, and death from obstructed respiration be imminent, I would not hesitate to resort to tracheotomy, and even if one life out of ten, or one out of twenty be saved, the surgeon will have his reward."

But while tracheotomy has fallen into such ill-favor in England, it has been gradually rising into repute in France, until, within a few years past, it has been established as a proper and legitimate method of treatment under certain circumstances of the disease. M. Bretonneau, of Tours, was the first who practised it with sufficient success in France to give it some vogue. Since that time, it has been recommended and performed by many different surgeons and physicians in that country, and particularly, as is well known, by M. Trousseau, who has been, undoubtedly, the most ardent and persevering, as well as the most experienced advocate of the operation. M. Trousseau, in his latest publication on this subject (*Arch. Gen. de Méd.*, Mars, 1855, p. 259), holds to his former opinions in regard to the operation, and thus boldly advocates it: "For my part, I am quite determined not to allow myself to be discouraged, but to preach tracheotomy with the greater conviction in proportion as its success increases, and did this proportion remain what it was ten years since, I should still proclaim the necessity of the operation, nor cease to say that it becomes *a duty*, a duty as imperative as the ligature of the carotid artery after a wound of that vessel, though death follows the operation as often, certainly, as recovery." M. Guersent (*Dict. de Méd.*, t. ix, p. 376) recommends the operation when the usual therapeutical methods have failed, "as the only means that offers a remaining chance." He adds (p. 377), that he is certain it does not add to the danger of the disease. MM. Rilliet and Barthez (*Mal. des Enfants*, 2ème edit., t. i, p. 337) say that "the utility of tracheotomy in the treatment of croup cannot at this day be denied. Numerous cases of children snatched from a certain and imminent death reply victoriously to any doubts that may be raised as to the truth of this assertion." The authors of the *Compendium de Médecine-Pratique* (vol. ii, p. 587), remark that of late years "the successful operations have been numerous enough to dispel the unfortunate prejudices which tracheotomy has hitherto inspired." M. Valleix (*Guide du Méd. Prat.*, t. i, p. 388) says that the number of recoveries are "now too numerous to allow any one to think of opposing the operation except by statistics." MM. Hardy and Behier (*Trait. de Pathol. Int.*, 1850, t. ii, p. 496), in speaking of the contest in regard to the propriety of the operation, say: "But the question seems now to be definitively settled; the operation has succeeded, in fact, in a little more than a fourth of the cases in which it has been performed, and in presence of these results, it may be said to become the duty of the physician to have recourse to it whenever, notwithstanding an appropriate treatment, the general and local symptoms indicate the extension of the false membrane." M. Bouchut (*Trait. des Mal. des Nou.-Nés*, 2ème ed., p. 316) says that when medical means fail, and the disease has produced a "state tending towards asphyxia, in which an attack of suffocation might cause the death of the child, there should be no hesitation; a new route must be artificially opened to the external air; tracheotomy must be performed."

In this country the operation has been performed from time to time by different persons, but generally, it must be confessed, without success. It is opposed by Drs. Dewees and Eberle, and is spoken of by Dr. Stewart, of New York, as a desperate resource. Dr. Condie (*Dis. of Children*, 3d ed., p. 332), speaks of it in the following terms: "That it may, in many cases, when timely performed, save the life of the patient, we have the most unquestionable evidence." Dr. Condie makes no mention of any personal experience in the operation.

For my own part, I am clearly convinced from what I have seen of the operation, from my reflections upon the nature of the disease and operation, and from the results obtained by the French physicians and surgeons, that tracheotomy is entirely justifiable under certain conditions of croup. For the information of the student and younger practitioner, however, I will examine this important matter in greater detail.

In discussing the question of the propriety of tracheotomy in croup, it is evident, especially after the conflicting opinions cited above, that there are two points in particular to be examined: 1. Whether it offers any chance of success whatever; and 2. Whether it is in itself dangerous. Now, in regard to the first point, we found, on consulting the English medical authors, that they were almost universally of opinion that it is scarcely ever successful, and therefore unjustifiable. When we turned to the French writers, on the other hand, we found that most of the recent authoritative writers on the diseases of children and on practice, recommend it as a legitimate method of treatment, and even press it upon us, as offering much additional chance of safety to the patient. The success of the operation amongst the French has been as follows: M. Bretonneau had six recoveries in twenty operations; M. Leclerc, of Tours, had one in two; M. Velpeau two in ten, and M. Petel, three in six (*Rilliet et Barthez, Mal. des Enfans*, t. i. p. 379). M. Valleix (*Loc. cit.*, p. 389) states that he found, upon examining into the results of tracheotomy, that the operation had been successful in nearly *one out of three*. M. Trousseau, who has performed the operation so much more frequently than any one else, is said to have had one hundred and thirty-five operations, of which only one in four was successful, up to the year 1850 (*L'Abeille Médicale*, June 1st, 1852, p. 146). Since 1850, his success has been much greater, owing to certain modifications in the canula he employs, and in the after-treatment of the case. In 1850, he had six operations, and in the first months of 1851, eleven. Of the seventeen, seven were successful. M. Trousseau, in a very interesting paper on "Tracheotomy in the last stage of croup, and on the means most likely to render it successful," already referred to, reports his cases for the year 1854, as nine in number, of which seven were successful, and states this as the largest proportion of cures he has ever obtained. He gives also the number of his operations in the last four years as twenty-four, of which fourteen, or more than half, were successful. The modifications above alluded to have been introduced into the Children's Hospital at Paris, and with the following results. In the space of fifteen years, more than forty operations had been performed without a single cure. M. Trousseau, in the paper referred to, gives the results of the later operations in that hospital as follows: In 1850, twenty operations; six cures, or nearly one-third. In 1851, thirty-one operations; twelve cures, or more than a third. In 1852, fifty-nine operations; eleven cures, or a little less than a fifth. In 1853, sixty-one operations; seven cures, or only a ninth. In 1854, forty-one operations; eleven cures, or about a fourth. In all, two hundred and sixteen operations, with forty-seven cures, or nearly a fourth. This result he regards as considerable when we reflect on the class of patients taken to the hospital, on the improper treatment they have frequently undergone beforehand, and on the unfavorable hygienic conditions to which they are exposed in the hospital.

And he doubts not that, in private practice, the recovery of half the cases ought to be the rule, provided the operation be performed under conditions of possible cure. Of the modifications made by M. Trousseau, in his methods, I shall speak hereafter.

The operation has not, I believe, been performed very frequently in this country, as I can find but few examples of it on record. Dr. Dewees, however, mentions two operations by Dr. Physick in this city, both of which proved fatal. Two are reported in the Transactions of the New York Academy of Medicine (vol. i. part i. 1851),—one by Dr. Van Buren, and the other by Dr. Buck. The former was unsuccessful, the latter successful. Another operation, which failed, is described by Dr. William Pepper of this city (*Trans. of the College of Physicians of Philad.*, Vol. III. No. III. p. 106). Dr. Page, of this city, has kindly given me the details of a case in which he operated. It was that of a girl, aged three years, who was attended by Dr. Leib from October 4th, 1851, to October 9th, during which time calomel and Dover's powder, and emetics, were freely given, a blister applied, and topical applications made to the fauces. On the 9th October, the ninth day of the disease, finding the patient very much oppressed, anxious, somewhat cyanosed, and rapidly sinking, Dr. Leib sent for Dr. Page to perform the operation. This was done without any difficulty other than a profuse venous hemorrhage, which was, however, only momentary, as it was instantly checked. A triangular piece was removed from one of the rings of the trachea. The mercurial treatment was continued, and the patient did well until midnight of the 11th, when she began to sink, and died on the morning of the 12th, about sixty-two hours after the performance of the operation. Dr. Keating, of this city, has had the operation performed twice in his practice, once by Dr. Pancoast, and once by Dr. Goddard. The former operation was successful, the latter failed. I have had it twice performed in my own practice by Dr. Pancoast: one terminated favorably, the other not. In a third case, which occurred in the practice of my father and myself, the operation was also performed by Dr. Pancoast, and was successful. In a fourth case, to which I was called in consultation, the operation was performed by the same surgeon, but was unsuccessful. Dr. H. H. Smith (*Operative Surgery*, 2d ed., vol. i. p. 473) gives the results of twenty-six operations performed in this country, including the cases above alluded to. Of the twenty-six cases nine recovered. I have heard of four operations performed since then, all of which proved fatal, so that out of thirty operations, only nine resulted successfully.

We have ascertained now that the success from the operation was one in three or four in France up to 1850. In 1854, M. Trousseau had 9 operations, of which 7 were successful; while in the four years, 1851, 1852, 1853, and 1854, he had 24 operations with 14 cures. In the five years from 1850 to 1854, inclusive, there were performed at the Children's Hospital in Paris, 216 operations, of which 47 resulted in recovery, or less than a fourth.

In this country, as was stated above, there were 9 recoveries out of 30 operations, or about one in three and a third, which is quite a good success, since assuredly here the operation has been practised only as a last resort.

Now, in order to form an opinion as to the real merits of the operation, it is necessary to have some idea as to the number of subjects that might have recovered without a resort to it. This is very easily arrived at in this country, since it is never performed here except as a last resort, when the patient is manifestly in great danger of death, or absolutely moribund. In the four cases that occurred in my own and my father's practice, I have no hesitation in believing that death would have been an almost inevitable result in all but for the operation, whereas by that two were saved. In regard to the French operations it is not so clear whether some of the patients, who recovered after the operation, might not have been as fortunate without it, particularly as M. Trousseau formerly recommended that it should be performed as soon as we can be certain that the larynx contains false membranes. But then it is generally understood that he was not called to many of the cases upon which he operated until all other means had failed, and the child had fallen into an apparently hopeless condition. To elucidate this matter, I shall quote the statements made by M. Valleix, one of the most accurate and impartial of writers. M. Valleix (*Loc. cit.*, p. 388–9) tells us that he collected together fifty-four cases of undeniable, well-marked true croup, treated without the operation, and found that seventeen had been cured. Then, examining what had occurred in regard to the operation, he found, as M. Bricheteau had done before, that nearly *one in three* had recovered, a success almost precisely the same as had taken place in the cases treated by medical means alone. "But," he goes on to remark, "there is a consideration of very great importance, one which gives an altogether different importance to tracheotomy, to wit, that in the immense majority of instances, the operation was performed under the most discouraging circumstances, and only when all other methods of treatment had proved useless, and the severity of the symptoms, and the near approach of asphyxia, indicated impending death. Who can fail to see that a single cure, under such circumstances, is of much greater weight than several obtained in cases against which all the resources of the art had been applied from the first?" We have here the evidence of a most competent witness, living on the spot, to convince us that the operation is not resorted to in France, at least generally, early in the disease, but is performed only as a last resource, when the chance for the patient from the efforts of nature or from medical means is almost null. How, then, can we resist the conviction that tracheotomy does afford a sufficient probability of success, after other means have failed and death is fast approaching, to render a recourse to it at least justifiable, if not almost compulsory?

The second point to be examined, in discussing the propriety of the operation is, whether it be in itself dangerous.

From all that I can learn, it appears that the only serious danger attendant upon the operation is the occurrence of hemorrhage. When performed for the removal of foreign bodies from the air-passages, the patients almost always recover, if the foreign body do but escape. M. Ollivier (Article *Larynx, Corps Etrangers, Dict. de Méd.*), says that the success of the operation is, so to speak, certain, when it is performed early. Liston disapproves of the operation in croup, but states that it is not attended with much danger. Skey regards it as an operation of some difficulty and danger, from the irregularity in the distribution of the vessels, and the existence of numerous veins, which may bleed profusely. M. Boyer does not regard it as dangerous, and states that the only danger is from the occurrence of venous hemorrhage into the trachea, and not from the amount of blood lost. Chelius says that it is dangerous below the cricoid cartilage from anastomosis of the thyroidean arteries, from the presence of venous plexuses, and sometimes from a deep thyroidean artery. Velpeau speaks of the venous hemorrhage as alone dangerous. Lastly, M. Trousseau, who has had more experience in the operation by far than any one else, states (*Rilliet et Barthez, Loc. cit.*) that he has performed it one hundred and twenty-one times, and has met with but a single accident in all of these. In this case, performed in a man fifty-two years old, for a laryngeal disease causing extreme suffocation, an epileptiform convulsion occurred just as he was making the first incision. He imprudently continued (to use his own words), when a second convulsion occurred, and was immediately fatal. M. Trousseau remarks that tracheotomy and laryngo-tracheotomy, performed to remove foreign bodies, "are never scarcely followed by fatal accidents: the operation is not therefore in itself dangerous." Dr. Pancoast of this city, who has operated in more than nine cases of croup, and a number of times for the removal of foreign bodies in the air-passages, has never met with any serious difficulty in the performance of the operation, nor with any accident which he could suppose might have affected the life of the patient. Dr. H. H. Smith (*Loc. cit.* p. 474) gives a table of forty-three operations for the removal of foreign bodies from the air-passages, all performed in this country, and of these five ended fatally. Dr. Smith remarks, that "in comparing the results of these two tables (including operations for croup and those for the removal of foreign bodies), it is very evident that the dangers which ensue upon incising a healthy trachea are comparatively slight, and that the great mortality which has attended the operation, when performed for the relief of croup, must be due to some other cause than the mere incision of the windpipe."

From the above quotations in regard to the danger from the mere operation itself, setting aside that from the disease or accident for which it is performed, it would appear that the only serious risk is from hemorrhage, and that this, though it is alluded to by many surgical writers, cannot be very great, since thirty-eight out of forty-three operations, performed for the removal of foreign bodies, were successful.

I think it has now been shown, by citations of the opinions of persons experienced in the operation, and by statements of the results obtained from it in France and this country, that it does really offer some additional means of safety to the patient, after the failure of all proper medical means. That it has saved the lives of some, at least, of the numerous subjects upon whom it has been performed, which would otherwise have been lost, no reasonable and unprejudiced person can, it appears to me, deny. That some who have been operated upon might have recovered without it, I do not doubt; but the uncertainty as to the absolute necessity of resorting to it in any individual case, is not greater, probably, than that which exists in regard to a great many other surgical operations, and to many medical applications. It has also been shown, I think, that the operation is, in itself alone, but slightly dangerous to life, at least when performed by a firm and dexterous hand. This removes, of course, the greatest objection to it, since, if the risk from the incision add but little to the danger of the patient, we may venture a resort to it for its probable chance of good even though that chance be only a moderate one.

I wish it distinctly understood, however, that while I, after a careful examination of the evidence for and against the operation, feel myself entirely justified in recommending it under certain circumstances, I am not so thoroughly convinced of its utility as to feel myself at liberty to urge it strongly upon the parents of the child. My own plan is to try faithfully all medical means, and, being satisfied of their powerlessness, to propose the operation to the parents, setting before them its chances and its risks, and allowing them to determine whether it shall be performed or not. Should they throw the whole responsibility upon me, I should act as I would in the case of my own child,—advise the operation. My grounds for so doing are very simple. The operation does assuredly sometimes save life. It is not in itself attended with any great danger. I do not see that it can, or only to a minimum extent, lessen the chances of escape from the disease. Lastly, it does, I think, mitigate the sufferings of the patient. On one occasion, indeed, I was told by the parents, after the death of their child, that they were very glad it had been performed, since, at all events, it had removed the frightful gaspings and strugglings for breath which had previously convulsed the whole frame of the poor little sufferer, and had rendered his last hours easy and tranquil.

If we decide that tracheotomy is justifiable, it becomes all-important to determine the period of the disease at which we should have recourse to it. M. Trousseau formerly laid down the rule, that it was to be performed so soon as it was certain that false membranes had formed in the larynx. He fixed upon this as the proper moment, because he believed that death was, under these circumstances, almost inevitable. In his last essay on the subject, however, he seems to have modified this rule, for the title of his paper is, "On Tracheotomy in the *Extreme Period* of Croup." He also opposes the operation *in toto*, under certain conditions, as will be seen from the following extract (*Loc. cit.*, p. 285). He says, speaking of the repugnance to the operation which exists in certain European countries, and especially in Great Britain, that he finds the cause of this repugnance "in an entirely false idea, to wit, that tracheotomy performed in the extreme period of croup is rarely followed by success." He opposes the operation, under certain circumstances, in the following words (p. 260): "For, if the diptheritic infection have profoundly attacked the constitution, if the skin, and especially the nasal passages, are occupied by the specific inflammation, if a frequent pulse, delirium, and prostration, show the system to be deeply poisoned, and if the danger is rather from the general condition than from the local lesion of the larynx and trachea, *the operation ought never to be attempted*, for it is invariably followed by death; but, if the local lesion constitutes the principal danger of the disease, it matters not what degree the asphyxia may have reached, and had the child but a few moments to live, the operation succeeds almost as well as if it had been performed three or four hours sooner."

MM. Rilliet and Barthez (2ème ed., t. 1, p. 340), in discussing the period at which the operation ought to be performed, conclude that it should not be resorted to until the means that have succeeded in other cases have been fairly tried, and it has become evident that they must fail. They advise the practitioner not to wait, however, too long a time, but to operate even early, should the patient suffer a paroxysm of suffocation so severe as to make it probable that another might prove fatal.

The opinion held at one time, that it ought to be performed so soon as there is a certainty of the presence of the deposit in the larynx, is clearly untenable. We have already learned from M. Valleix that of fifty-four perfectly well-marked cases collected by himself, treated medically (without the operation), seventeen, or about a third, recovered. If we add to this that of twenty-two cases seen by myself, ten recovered without the operation, it becomes very clear that the presence of the exudation in the larynx is not sufficient warrant for a resort to the operation. And, indeed, most authorities advise that we should wait until medical means have been fairly tried, a course almost universally pursued, I believe, in this country. When, however, these means have been tried, and when, in spite of them, the condition of the patient is becoming aggravated, when the dyspnœa, stridor, aphonia, and gradual progression of the symptoms, and when, particularly, the appearance of asphyctic phenomena denote a steady increase of the laryngeal obs truction, the operation, if it is to be thought of at all, ought to be proposed. In one of the cases that occurred in my practice, and which ended favorably, the symptoms had gone even further than this, for the bluish skin, drowsiness, and insensibility to pain, showed that the patient had already sunk into a very advanced asphyctic condition.

The operation ought not to be attempted under certain conditions, as, for instance, that of the existence of double pneumonia. Pneumonia of a single lung is not, however, according to M. Guersent, a contra-indication. The presence of any serious organic disease renders it improper of course. There is another condition of the disease which, it is thought by many, and at one time this was my own opinion, ought to constitute an insuperable bar to the operation, and the possible existence of which, in any case, is one of the most serious objections that has been brought against it The condition to which I allude is the presence of the pseudo-membranous exudation in the bronchia.

The existence of this condition must greatly lessen the chances of a successful operation, but that it renders success impossible, as has been supposed, is at least doubtful. MM. Rilliet and Barthez (*Loc. cit.*, 2ème ed., t. i, p. 838) say: "It has been said that one contra-indication was the presence of false membrane in the bronchia. But besides the fact that the symptoms denoting their presence are uncertain, we cannot see in this a positive objection to the operation. Recovery has been known to occur, in effect, after the rejection of bronchial false membranes, and we ourselves were witnesses of a remarkable example of this kind. And is there any better mode of facilitating the escape of foreign bodies than by opening to them a passage below the larynx? Under such circumstances, we must expect, to be sure, a greater mortality than under more favorable conditions. This opinion is, moreover, that of M. Bretonneau."

I believe I may safely assert that I saw a child recover from croup in whom the deposit had extended into the bronchia. The proof of this extension was not the rejection of bronchial false membranes, for the exudation was ejected in fragments too small to show from what parts they came. The proof consisted in this: that, after the violent laryngeal symptoms had subsided, the upper lobe of the right lung was found to be in a state of collapse, which lasted for three or four days. Over the right clavicle, and for two inches beneath it, there was, during the time just mentioned, marked dulness on percussion, with very feeble respiratory murmur, while there was neither bronchial respiration, crepitant râle, rusty expectoration, pain, fever, nor any other sign of pneumonia, to explain these physical signs, which it was reasonable to suppose, therefore, depended on the presence of a membranous plug obstructing the bronchus which supplied that part of the lung-tissue, and causing collapse.

But, even granting that such an extension of the deposit ought to constitute a bar to the operation (and it certainly ought to do so unless all the other symptoms were of the most promising kind), it is, nevertheless true, that there are no means by which we can with certainty determine whether such extension has taken place or not.

It was at one time thought that auscultation might afford the desired information, but more careful observation has shown that it is not to be depended upon. I have already said, that in most cases the laryngeal stridulous sound is so loud as to mask all chest-sound, and the following cases show that even when this does not happen, very little is to be learned from physical examination. The first case I shall refer to is one mentioned by MM. De La Berge and Monneret (*Comp. de Med. Prat.*, t. ii, p. 587), in which they could not believe that the bronchia contained false membranes, as the vesicular murmur was extremely pure, and was heard everywhere; and yet, during the operation, a false membrane was drawn out, which represented the trachea and the division of the principal bronchia. The child died in fifteen hours. Dr. Wm. Pepper, of this city, reports two fatal cases (*Summary of Trans. Coll. Phys.*, vol. iii, No. iii, p. 106) in one of which "distinct vesicular murmur could be heard throughout the lungs, marked only, occasionally, by sibilant and sonorous rattles," a few hours before tracheotomy was performed. The child died twenty hours after the operation, and the exudation was found to implicate the larynx, trachea, the large bronchia, and even some of the smaller ramifications. In the other case, the state of the respiration was carefully examined the day before death, and not the least respiratory murmur could be heard over any part of the chest, and yet, in this instance, the exudation was confined strictly to the larynx,—not a vestige of false membrane was to be found either in the trachea or bronchia. These cases show clearly, it seems to me, that little or nothing is to be gained from auscultation in elucidating this important point.

In a published account of several cases of this disease (*Am. Journ. Med. Sci.*, April, 1849, p. 332), I suggested that we might infer, with some probability, the extent of the exudation, by a careful consideration of the history of the case, and of the general symptoms. From an examination of four cases, in which the extent of the exudation was ascertained, either by the operation, or by post-mortem examination, I found that the pulse was much less rapid, during the course of the disease, in those in which the membrane was confined to the larynx alone, or to the larynx and trachea, than in those in which it had invaded the bronchia. Thus, in two cases in which the bronchia were implicated, the pulse counted from one hundred and forty to one hundred and fifty for several days before death in one, and one hundred and sixty-four just before the operation in the other; while in two others in which only the larynx and trachea were diseased, it was one hundred and thirty in one, and in the other between one hundred and twenty and one hundred and thirty. Moreover, in the case reported by Dr. Pepper, in which the disease was found strictly confined to the larynx after death, the pulse was only one hundred and twenty the day before the fatal event. In the other case by Dr. Pepper, in which the bronchia were implicated, the state of the pulse is not given; it is merely stated that it was frequent and feeble just before the operation. I shall conclude my remarks upon this point, by suggesting, that, in all probability, not only would the pulse throughout the attack be more frequent, but that also the signs of asphyxia will have lasted longer, and have come on more slowly and gradually, in cases in which the bronchia are diseased, than in those in which they are not.

But, even if we adopt the worst view of the case, and conclude that it is impossible by any means now within our reach to determine the extent to which the exudation may have invaded the air-passages, it is still very doubtful whether we ought for that reason to abandon the operation. In effect, it has been well established by numerous observations, which have already been detailed, that the membrane extends into the bronchia only in a third of the cases, leaving two-thirds in which it remains limited to the larynx alone, or to the larynx and trachea. The question becomes, therefore, one of expediency, whether to leave two-thirds of the patients, some of whom might be saved by the operation, to perish without an effort to save them, because one-third *must* probably die, or to perform it almost without a prospect of success in a third, for the sake of the chance of saving some of the remaining two-thirds who must otherwise die.

OPERATION.—I shall not pretend to describe the operation, but must refer the reader to the works on surgery, to the article on tracheotomy by M. Valleix (*Loc. cit.*, p. 386) to the one by M. Trousseau, in the first volume of the work of MM. Rilliet and Barthez, to that by the same writer in the Dictionnaire de Médicine (t. ix, p. 381), or to the work of Dr. Henry H. Smith, of this city, on Operative Surgery, in which will be found an account of the various modes of operating, and particularly of the one employed by Dr. Pancoast, which appears to me to be much the best. I deem it necessary, however, to call attention to a peculiarity of Dr. Pancoast's mode of operating, and to some modifications recently introduced by M. Trousseau, in the kind of canula he employs, and in the after treatment of his patient.

The peculiarity of Dr. Pancoast's operation consists in the circumstance of his excising a portion of the walls of the trachea. This method was first recommended, apparently, by Mr. Lawrence, of London, was successfully employed on one occasion by Mr. Carmichael, of Dublin, and is now adopted by Dr. Pancoast in order to avoid the necessity of employing canulas or dilating instruments, which cannot but be more or less irritating and injurious. Dr. Pancoast, in the case which he describes, excised "an elliptical piece from the front part of the third, fourth, and fifth rings of the trachea." "The piece excised in this case was about a third of an inch long, by about two-tenths of an inch broad." Dr. Pancoast holds apart the edges of the wound made in the soft parts over the trachea, by means of a piece of thick leaden wire bent so as to form hooks at either end. The wire is of such a length as to fit accurately when the hooked ends are placed within the edges of the incision, around the neck, and thus keeps up just sufficient traction in opposite directions to maintain the wound open.

M. Trousseau (On Tracheotomy in the Extreme Period of Croup), lays great stress on the modifications that have taken place in the treatment of the disease, both before and after the operation. He says that the patients are now no longer exhausted by bleeding, nor by the use of vesicatories, and adds, that the reason why he has been more successful of late in his operations than formerly, is quite as much owing to the better previous treatment of the patient, as to the method he has followed.

The operation being performed, the first thing the physician should think of, he says, is the alimentation of the child. Abstinence, he looks upon as one of the most dangerous of complications, not that the child ought to be gorged with food, but that its appetite, if it have any, should be satisfied, and if it have none, that it should be forced to take a little food. "Do not fear," he says, "to employ intimidation. In such cases, I have often, assuming an apparent severity, the expression of which I have exaggerated, forced the child to eat, and so have prepared the way for a recovery, which without this, seemed to me impossible. Milk, eggs, ice-cream, chocolate, and soups, are the means on which I insist most." He proscribes the use, after the operation, of the remedies deemed more or less useful prior to it, such as calomel, alum, emetics, and purgatives, which he deems incompatible with the alimentation he insists upon.

He refers particularly, also, to the difficulty the patient has in swallowing liquids, which, passing through the glottis into the trachea and bronchia, cause violent coughing, and escape through the artificial opening. The child is so alarmed by this sometimes that it refuses all nourishment, and may die for the want of it. The best means of avoiding this difficulty, is to interdict all liquid aliment. He gives very thick soups, vermicelli boiled in milk or broth, hard eggs, eggs very much cooked in milk, and rare-cooked meat in rather large morsels. If the thirst become ardent, he allows pure cold water, taking care to give it either some length of time after, or immediately before, the meals, in order to avoid vomiting. This difficulty in swallowing, he remarks, does not generally begin until three or four days after the operation, and rarely lasts beyond the tenth or twelfth day. Sometimes, as M. Archambault has suggested, the child is enabled to swallow with ease by closing the canula with the finger at the moment of deglutition, but at other times this fails entirely.

M. Trousseau has abandoned the use, after the operation, of the caustic instillations into the larynx and trachea, which he formerly employed in every case. He rarely makes use even of emollient injections. He now employs a double canula instead of a single one as formerly, which latter he was obliged to remove two or three times in the twenty-four hours, a proceeding always painful and nearly always difficult during the first two days. Now, the parents remove the internal canula every few hours, or as often as it becomes clogged, and clean and replace it without causing pain or irritation. Formerly, the neck being left exposed to the air, the mucus in the canula and trachea dried up so rapidly that he resorted to frequent instillations of water, and a process of swabbing out with a sponge-mop, in order to remove the obstructions caused in this way. Now, so soon as the operation is finished, he envelopes the neck in a knitted woollen scarf or a large piece of mousseline, so that the expired air is in part inhaled again, thus preserving its warmth and particularly its moisture. By this proceeding, the desiccation of the mucus in the trachea and bronchia is avoided, expectoration is much easier, and injections and swabbing are no longer necessary. M. Trousseau formerly left the wound exposed to the air, contenting himself with dressing it sometimes with a little charpie covered with cerate. The wound became covered with false membranes, inflamed violently, and sometimes even gangrenous. Now, he places over the charpie a piece of waxed silk, pierced with a hole for the passage of the canula, by which means the incision is protected doubly by the cravat and by the shield of waxed silk. On the day after the operation, he cauterizes vigorously, with the lunar caustic stick, all the divided parts, in order to prevent the extension in them of the diptheritic deposit, and repeats the cauterization once daily for three days longer.

The very great improvement in the results of the operation, since these modifications have been carried out in M. Trousseau's practice, and also in the Children's Hospital at Paris, have been already mentioned.

CHAPTER II.

DISEASES OF THE LUNGS AND PLEURA.

GENERAL REMARKS.

It would be difficult, perhaps, to over-estimate the importance to the medical practitioner of a thorough knowledge of the different diseases of the lungs and pleura, as they occur in children. The diseases of the respiratory organs,—and much the most frequent of them are pneumonia and bronchitis,—cause, according to Dr. West, of London, very nearly a third of all the deaths under five years of age in England; while not above one child in four dies under that age from diseases of the nervous system, and not above one in seven from those of the digestive system. In this country, it would seem from the bills of mortality that a larger proportion of children die of diseases of the digestive than of the respiratory system. But while this is true, there can be no doubt that the diseases of the latter system are deserving of our utmost attention, since not only are they of constant occurrence, and of fatal tendency, as idiopathic affections, but since also they frequently appear as complications in the course of other diseases, adding greatly thereby to their severity and danger. In measles, for instance, by far the most frequent cause of danger is the occurrence of some inflammation of the lungs or pleura. In scarlatina and typhoid fever, bronchitis and pneumonia are very common accidents, and recent researches have shown that in hooping-cough and in all states of great debility and prostration, a certain change in the condition of the pulmonary tissue, to which the term collapse has been applied, is very apt to occur.

The morbid condition of the lung last referred to, that of collapse, is one that has been well understood only within a few years past, and yet it is so important a one, in a practical point of view, as to excite a feeling of surprise that it had not been discovered before.

ARTICLE I.

ATELECTASIS PULMONUM, OR IMPERFECT EXPANSION OF THE LUNG.

The title of atelectasis pulmonum, from *ατελης*, imperfect, and *εκτασις*, expansion, was first employed by Dr. Edward Jörg, to designate a condition of the lungs observed by him in new-born children, a condition in which larger or smaller portions of those organs had never been penetrated by air. The respiration of the infant had been established, in such cases, more or less imperfectly, at birth, and some parts of the pulmonary tissue had consequently never undergone expansion under the distending influence of the inspiratory act; these undilated parts continued in the fœtal state.

In addition to this *congenital* form of imperfect expansion of the lung-tissue, this condition is met with at all ages of life, though with especial frequency in young children, as the consequence of a *collapse* of portions of the once expanded lung, or, in other words, of their return to the fœtal or unexpanded state. To this latter form of imperfect expansion the terms post-natal atelectasis, collapse, and fœtal condition have been given. Before the discovery of its real nature was made, it had often been described also under the well-known names of carnification and lobular pneumonia. I shall designate it by the title of collapse, or post-natal atelectasis, while under that of congenital atelectasis pulmonum, I shall describe the congenital variety of imperfect expansion.

CONGENITAL ATELECTASIS.

ANATOMICAL APPEARANCES.—In congenital atelectasis the parts of the lung most frequently affected are the posterior portion and lower edge of the inferior lobes, the middle lobe of the right lung, and the languette and lower edge of the upper lobes. In some instances, as in four examined by myself, the greater part of the lower lobes of both lungs, while in others, still larger portions of these organs, have been found to present this condition. The imperfectly expanded portions of the lung are of a dark red, or purplish color, and are diminished in size, so as to be depressed below the level of the healthy parts. They are solid to the touch, and yet they have not lost their cohesive properties, as they are neither friable, easily torn, nor readily penetrable by the finger; their cut surface is perfectly smooth; they do not crepitate under the finger, and no air bubbles are seen in the fluid squeezed out by pressure; they sink when thrown into water. They, in fact, resemble exactly the fœtal lung. The most convincing proof of the real nature of this condition is obtained by the inflation of the lung. When this is done, the depressed, hard, and dark-colored portions, unless the subject from whom the specimen has been taken may have lived long enough to have allowed the different tissues of the lung to become adherent, rise to their natural level, become elastic, soft, and crepitating, and change, under the influence of the entering air, from a dark and livid tint, to the rosy or pink color of healthy pulmonary tissue. In recent cases, this inflation is performed with great ease, and with perfect success, while in other instances, in which the child has lived for some weeks or months, the distension is either effected only by strong efforts, or in a very imperfect manner, or it may fail entirely, owing to some permanent change having taken place in the tissues of the unexpanded portions. In a case that occurred to myself, the subject of which died at the age of fourteen months, of acute pleurisy of the right side, after having presented at birth and throughout its short life many of the symptoms of atelectasis, the inferior two-thirds of the lower lobe of the left lung exhibited in the greatest perfection all the atelectasial characteristics. The whole of the unexpanded part was distended by means of inflation with a blowpipe, but only after repeated and powerful expiratory efforts, and my friend, Dr. E. Wallace, who made the examination, assured me that he was obliged to use a degree of force much greater than he ever employed to inflate healthy adult lung.

In most cases, the foramen ovale and the ductus arteriosus are found to be still open, or the latter has but partially closed.

The *causes* of congenital atelectasis have not been satisfactorily ascertained. The only conditions that have been well made out as probable causes are: original debility of the infant, from any cause that has interfered with its proper development in utero, as feeble health on the part of the mother during pregnancy, or multiple pregnancy; and acquired debility, brought about by the fact of the infant's being exposed at birth to unfavorable hygienic influences, and particularly to those which interfere with the proper performance of the respiratory act, as cold, a vitiated and close atmosphere, and the use of too heavy or tight clothing. A very hurried and rapid labor has been thought to cause, in some instances, this imperfect expansion of the lung-substance. In one case that occurred to myself (See *Am. Journ. Med. Sc.*, Jan. 1852, p. 83), the only explanation of the condition, which seemed at all plausible, was that the placenta had been separated from the uterus at too early a period of the labor, in consequence of the violent and rapid character of the latter, so that the child was for a short time before birth cut off entirely from its connection with the mother,—a time sufficient so to lower its vital forces, as to bring on a condition resembling syncope, and to deprive it of the muscular strength necessary on entering the world, to produce a full expansion of the thoracic cavity, and so of course to effect a dilatation of all parts of the lungs.

SYMPTOMS.—The symptoms depending on congenital atelectasis vary a good deal in different cases. There are some, however, which exist in most of the cases. These are the following: the child comes into the world feeble and weak, and instead of crying vigorously and loudly the moment or very soon after it is born, it fails to cry at all, or the cry is low and weak, or it is whimpering or wailing; the color, instead of being brick-red or dark-red, is pale and whitish, leaden, or livid; the muscular movements, which, in healthy children, are strong and vigorous, are in these, languid and slow, or there are none or scarcely any, the limbs being relaxed and motionless. If the breathing is observed, it is found to be short, high, and imperfect, and it is evident that the thorax is but imperfectly dilated at each movement of respiration. When these symptoms exist in a very marked degree, the infant either dies soon in a state of asphyxia, or, the muscular force slowly increasing, the respiration gradually improves, and the child is, after a longer or shorter time, either out of danger, or it falls into the same state as that of one in whom the symptoms have been from the first less severe. Under the latter circumstances, the infant continues feeble and weak. It breathes shortly, rapidly, and imperfectly, but often without any appearance of labor. The cry is rare, and, when heard, is low and feeble, or, there is a constant plaintive moan, which is very characteristic, and strongly expressive of exhaustion, with each respiration. The color continues pale and whitish, or it is bluish, and the temperature of the extremities is lower than natural. The child sleeps the greater part of the time, and is unable to nurse or nurses very feebly, but can swallow when fluid is poured into the mouth. In such cases as these, the infant does not necessarily die, but will often recover when properly treated. In favorable cases, the symptoms just enumerated may last from a few hours to a day or two, or even a few weeks, without much change; then, under the influence of correct hygienic and medical treatment, they will often begin to improve. The color becomes less pale or less bluish; the muscular movements are somewhat stronger; the child begins to cry, and in a louder tone; the act of swallowing is easier and more perfect, or the infant is able to suck when applied to the breast, at first feebly and only for a moment, and then more strongly; the respiration becomes slower, fuller, and more natural, and gradually the dangerous symptoms disappear.

In unfavorable cases, on the contrary, the respiration fails to improve, but becomes more and more short, quick, and imperfect; the temperature of the body falls; the color of the surface changes, becoming leaden, bluish, or even livid, the change showing itself first in the neighborhood of the mouth, and in the hands and feet, and extending gradually to the rest of the body; the difficulty in swallowing becomes greater, and very generally some spasmodic twitchings begin to show themselves about the muscles of the face. The respiration is very often attended with slight wheezing or rattling, and the convulsive movements returning frequently, and becoming more violent and more general, the child dies in convulsions, or it sinks very slowly and gradually, without convulsions, as though in a state of syncope.

There is another symptom of imperfect expansion of the lungs in new-born and very young infants, which ought not to be passed unnoticed. It is one mentioned by Dr. George A. Rees, of London, in an essay on this subject (London, 1850), and which is regarded by him as the pathognomonic symptom of the condition. It is an altered movement of the ribs in respiration. During the inspiratory effort the ribs are seen to move inwards towards the mesial line of the trunk, instead of outwards as in ordinary respiration, thus diminishing instead of expanding the transverse diameter of the thorax. The explanation of the altered movement is as follows: when the diaphragm descends, the lung ought to expand in such a way as to fill up the increased space produced in the thoracic cavity by the descent of that great muscle. Instead of this being the case, however, the lung is collapsed and inexpansive, and cannot enlarge sufficiently to fill up the space alluded to, so that there would remain a vacuum in the chest were it not that the thoracic walls are driven inwards by the pressure of the atmosphere upon their outer surface. In a case that I saw myself in a child fourteen months old, who had presented symptoms of atelectasis from birth, and in whom I found after death very extensive collapse, this symptom was very marked. The base of the thorax was indented on both sides by a deep gutter or depression, which remained depressed and unchanged during the inspiratory movements, or which, indeed, rather became more distinctly visible during those motions, so that the chest presented the curious spectacle of dilatation or expansion in its upper parts, during inhalation, and of contraction or collapse at its base.

SYMPTOMS OF COLLAPSE IN THE EARLY WEEKS OF LIFE.—Before taking up the regular consideration of post-natal collapse, as it occurs at all ages of childhood, I wish to refer, for a moment, to that condition as it appears in the first few weeks of life, in infants who have exhibited no sign of it whatever, perhaps, at the moment of birth. I desire to do this now, because the symptoms which it gives rise to resemble much more those of congenital atelectasis, than those of collapse in children over a few months old. And let me remark, that these symptoms are very different, and much more severe and threatening than those of collapse at later periods. They are in fact those of cyanosis, and, in some instances, are as strongly marked as those observed in the worst cases of that condition, caused by malformation of the heart or great vessels. The cyanosis and other symptoms of disordered circulation, evidently depend on the obstacle offered by the collapsed and condensed portions of lung-tissue to the discharge of blood from the right side of the heart. Though this obstacle to the venous circulation is doubtless the chief cause of the symptoms in these cases, I cannot but think myself that the great difference between the symptoms of congenital atelectasis, as well as of post-natal atelectasis occurring in the first few weeks of life, and the collapse of later periods, must be explained in part, at least, by the fact that the fœtal openings, the foramen ovale, and ductus arteriosus, and especially the former, are still patulous, or in such a condition that they may be reopened under pressure, and so allow a portion of the contents of the over-loaded and congested right side of the heart, to pass into the left auricle, thence into the left ventricle and aorta, and so to the whole body.

In this form of atelectasis, the child may have been born perfectly healthy, or only weaker than usual, or it may have had some difficulty in establishing the respiration, which, however, has afterwards been effected in the most complete manner. Some days, or even weeks after birth, from a cause disturbing the function of respiration, portions of the lung may collapse, and give rise to the different symptoms of that condition in the manner above described. The most important of these symptoms are difficulty of breathing, consisting either in an increased or diminished rate of that function, diminution of the muscular power, cyanotic hue of the skin, and slight or severe spasmodic phenomena. In one case that occurred to myself (see *Am. Journ. Med. Sc.*, *Loc. cit.*), a child who had exhibited at birth, and for five days after, every appearance of fine health, was observed on the sixth day to cry rather violently in the morning. At one o'clock in the day he began to moan, and appeared distressed; at two he ceased to moan, became bluish, and seemed to lose his breath. He was placed in a bath, in which the blueness passed off, but the breathing continued irregular and uneven. He soon became blue again, and breathed slowly and irregularly, but had no spasm. At about four o'clock, another paroxysm occurred, in which the whole surface became first bluish, and then black, while, at the same time, the trunk and limbs became stiff and rigid under the influence of tonic muscular spasm, and the respiration was slow and imperfect. After the attack had lasted for some moments, the blueness and spasmodic phenomena disappeared, but the child remained in a state of stupefaction. There were two slight paroxysms of convulsive stiffening between this and evening, and later in the evening there was still some blueness, with irregular and short respiration. During the night the breathing was short and uneven, and attended with moaning, but on the following day the symptoms had disappeared entirely, and there was no return.

In another case the symptoms of collapse did not appear until the twenty-fifth day after birth. The infant had been hearty and strong at birth, and had established its respiration fully and completely. Between the birth, however, and the time of the attack, circumstances connected with the lactation had caused the development of diarrhœa with thrush, which had debilitated the child a good deal. On the day of the attack, frequent sneezing, with stuffing of the head, and some cough, seemed to show the existence of cold, and, on the same day, the child was unfortunately exposed, owing to the accidental opening of one of the gas-burners, to the inhalation of some gas. Late in the evening, a slight whistling or stridulous sound was heard in the breathing, the skin became suddenly a little bluish, and a slight convulsion followed. During the night there were frequent and strong convulsive seizures, always preceded and followed by deep blueness of the mouth, hands, and feet, and it was noticed that the least disturbance, as lifting or nursing, or changing the position, always brought them on. The next morning the attacks continued, but with diminished violence, under the effects of treatment, and they ceased after the middle of the day. The color of the skin had now changed; it had become rosy red, instead of pale or blue, and the hands and feet, which had been cold, were now warm and natural. There was no return after this.

In a third case, a female infant, who had been perfectly well at birth and up to the moment of this attack, was put suddenly into a bath by the nurse on the eighth day, directly after its waking from sleep. The child, who was not thoroughly waked up, seemed greatly terrified, and began to scream most violently. Instead of removing the infant from the water, the nurse persisted in holding it immersed for some minutes, when it became deeply blue, and partially convulsed; it frothed at the mouth and nose, seemed to be suffocating for breath, and appeared to be dying. These symptoms continued for three-quarters of an hour, when they gradually passed away, and it fell into a heavy sleep. When I saw the infant, soon after this, the only signs of disorder that remained, consisted of an unusual paleness, drowsiness, and an expression of feebleness. Some three hours later, it waked, nursed, and from that time seemed quite well.

In a fourth case, a child born apparently well, with the exception of its having had a rather frequent respiration, and who nursed very well on the second and third day, was attacked on the fourth day, with blueness, moaning, short and panting respiration, and then with slight convulsive symptoms. It was unable to nurse, and though kept perfectly still, and fed from time to time with small quantities of milk and brandy, became gradually more deeply blue, had paroxysms of very slow respiration and circulation, with general convulsive seizures, and died at the end of twenty-four hours.

DIAGNOSIS.—There can be no difficulty in detecting the nature of the case, when the imperfect expansion exists from birth, and when the physician is present at that event.

When, however, collapse of the lung-tissue continues after birth, and the physician is called upon to determine at the age of some days, weeks, or even months, the cause of the feeble health and puny growth of the child, or to explain those sudden attacks of collapse in very young infants who had previously well established to all appearances the respiration, the diagnosis becomes more difficult. In the former class of cases, attention to the following points will usually, however, enable us to make a correct diagnosis. The previous history is particularly important, since, in all such cases, it will be found that the infant was either still-born and resuscitated with more or less difficulty, or that it was born weak and feeble, and that the respiration had not been established as thoroughly and completely as it ought to have been. Dr. Rees states that certainly half of the cases of this form, in his own practice, occurred in twins, and that they were all born in a more or less completely asphyxiated condition. The present symptoms are also very important. The feeble appearance of the child, and its puny growth, in connection with its past history, and the absence, as ascertained by careful examination of the case, of other morbid conditions to explain the general ill-health, ought to direct the attention of the physician to the true nature of the disease: and if we add to these considerations the local thoracic symptoms, the short, rapid, and imperfect breathing, with, perhaps, the altered movement of the ribs, the indentation instead of expansion during inspiration, mentioned above, the absence of fever, and the existence of the physical signs of more or less extensive solidification of the pulmonary tissue, without those of pneumonia, there will seldom be any difficulty in forming a correct diagnosis.

The cases described under the head of collapse in the early weeks of life, may be readily understood from the simple fact that the symptoms cannot be satisfactorily explained, by referring them to any other condition than that of collapse of portions of the lung, with impeded and deranged circulation.

PROGNOSIS.—The condition of imperfect expansion of the lungs in a new-born child, does not necessarily cause it to die immediately or very soon after birth. The fate of the child will depend very much upon its degree of innate strength and vigor, and upon the kind of hygienic conditions to which it may be consigned. When the child is well developed, and not enfeebled by any fault in the mother's health during the pregnancy, but merely by some momentary condition that has occurred during the labor, there is every reason to hope that proper hygienic and medical treatment may restore it to health. The danger is greatest in those who continue weak and feeble in spite of the proper measures of care and treatment for some days or weeks after birth. I have a record of ten examples of this condition in new-born children, in nine of which the symptoms persisted during a period varying between six hours and five days; of these, six lived, while three died in from twenty-one hours to three days, and one is still living at the age of six months, in a puny and weakly condition.

The prognosis of the second class of cases, those in which collapse occurs suddenly in a few days or weeks after birth, and after the apparently complete establishment of respiration, will vary, of course, with the violence of the symptoms. Of five cases of this kind that came under my observation, recovery took place in three in spite of the most dangerous and alarming symptoms, while in two death occurred in a period of about twenty-four hours.

TREATMENT.—The treatment of congenital atelectasis resolves itself almost entirely into the employment of such means as tend to invigorate the general health of the child, and to promote the activity of the respiratory act. In a recent case, one dating from birth, in which the function has always been imperfect, and in which there are present great feebleness, drowsiness, and paleness or blueness, the room in which the infant is placed should be kept up to a temperature of 70° or 75°, and the child should be abundantly covered with warm clothing. Perfect quiet, or at least very gentle motion, is very important, and when there is any disposition to deep blueness or to convulsive movements, attention to this point is essential. It is in such cases, and in those in which these symptoms come on a few days or weeks after birth, that the position recommended by my father, Dr. C. D. Meigs, for the treatment of cyanosis neonatorum, has been found by him so useful. This position is one upon the right side, with the head and shoulders raised at an angle of 45°. It is obtained by arranging pillows in such a way as to form a plane inclined at that angle. Upon this the infant is placed, and orders are given that it is not to be moved at all, if possible, or only with the greatest care and gentleness, for twenty-four or forty-eight hours. There can be no doubt that this position and the attendant repose have, in many cases occurring in my father's practice, and in several that I have seen myself, been of very great use in controlling the symptoms. Its good effects in cyanosis are supposed by my father to depend on the fact that the septum auricularum becomes, in this position of the body, horizontal, so that the blood in the right auricle must rise against gravity in order to pass through the foramen ovale, while, at the same time, the valve of that opening is disposed to fall down by its own weight, and close the foramen, and is, moreover, pressed downwards by any blood that may enter the left auricle from the pulmonary veins. This explanation will apply, of course, only to those cases of atelectasis accompanied by very extensive and deep blueness or purple color of the surface, in which we may suppose that so much of the pulmonary tissue is solidified, as to produce a degree of obstruction to the passage of blood from the right side of the heart into the lungs, sufficient to overload the right ventricle and auricle, until the latter pours a portion of its contents into the left auricle, thus causing admixture of the two kinds of blood. In a large majority of the cases of atelectasis, however, this explanation of the benefit resulting from the treatment referred to, cannot be received, as there is no reason to suppose that in them the slight cyanotic symptoms present indicate anything more than the existence of a moderate degree of congestion of the right side of the heart, unattended by any escape of blood from the right into the left auricle. In such cases the position on the right side is useful, because it is the one most favorable to a full and easy performance of the respiratory and circulatory functions. It leaves the left side free and unembarrassed, so that the heart can act with the greatest possible freedom, while the partial elevation of the head and shoulders renders the movements of the chest more easy and complete than when the body is lying on a horizontal surface. The perfect quiescence which constitutes a part of the treatment is also very important, as in many recent and particularly in cyanotic cases, the symptoms are greatly aggravated, and convulsive attacks often brought on by moving the child, especially if this be done suddenly or rudely.

Perhaps the most important point of all in the treatment of this affection, especially when the symptoms tend to become persistent, is the mode of nutrition of the child. If possible, the infant should always have a good breast of milk, and if unable to suck, the milk ought to be drawn by means of a breast-pump, and given to the child in small quantities from a spoon. About two or three teaspoonfuls may be given at first every half hour or hour, and the quantity gradually increased until the child gains strength enough to be put to breast. If breast-milk cannot be procured, cow's milk and water may be substituted, in the proportion of one part of the former to two or three of the latter. The only medicines to be given are, at first, while the child is still very young and weak, mild stimulants, of which the best, in my opinion, is fine old brandy. Of this about five drops may be given each time that the milk is taken; or, we may make use of from three to five drop doses of the aromatic spirits of hartshorn, or of proper quantities of wine-whey.

When the symptoms of congenital atelectasis tend to persist for several weeks or months, and when we first see the patient some time after birth, the chief points to be attended to in the treatment are, as before, the mode of nutrition, which ought to be by nursing, and the use of gentle stimulants and tonics. Brandy, wine, or Huxham's tincture of bark, are the best stimulants, whilst quinine, in the dose of a quarter or half a grain, three times a day, extract of cinchona, in the dose of from one to three or four grains, three times a day, or iron in the form of Quevenne's powder, or in that of the iodide, are the best tonics.

COLLAPSE OF THE LUNG OR POST-NATAL ATELECTASIS.

General Remarks.—By collapse of the lung is meant the return of that organ to its fœtal or unexpanded state. It is in fact a condition of atelectasis or imperfect expansion of its vesicular structure. The terms collapse or post-natal atelectasis are employed to contra-distinguish it from congenital atelectasis, the former being applied to imperfect expansion as it occurs in lung-tissue after previous expansion, and the latter, as stated in the preceding article, to the same condition as it exists in children who have never expanded certain portions of the pulmonary substance.

The true nature of collapse of the lung was never understood, and its great practical importance never appreciated, until since the year 1844, when MM. Legendre and Bailly published, in the *Archives Générales de Médecine* their researches on the subject. Since then various observers have repeated the investigations of those gentlemen, and thrown new light upon the matter. Among the most important of the later writers on this subject, I may mention Dr. Charles West, of London, MM. Hardy et Behier, of Paris; Dr. W. T. Gairdner, of Edinburgh, and MM. Rilliet et Barthez, in the second edition of their work.

This new discovery in pathology is one of very great value, not merely because it renders our knowledge of the morbid conditions of the lungs more exact and philosophical than it ever was previously, but because it explains certain anatomical changes in the pulmonary structures, often before noticed and described, but never satisfactorily accounted for; and still more, because it points to methods of treatment much more rational and much more successful than those employed under the influence of former ideas as to the nature of the lesions alluded to. The most important result of the new views, is the disclosure of the fact that several lesions met with after death, which were formerly thought to depend on inflammation of the affected tissue, are in reality, the consequences of collapse or obliteration of the vesicular structure of the lung, and not of inflammation, as was at one time supposed. The lesions alluded to are those which have been hitherto described under the names of lobular pneumonia and carnification.

The peculiar character of the lesions met with in many of the supposed cases of pneumonia had often drawn attention and been commented upon, before their real nature came to be understood. The points of difference between these alterations and those of true pneumonia, were particularly noticed by MM. Denis, De La Berge, Rufz, Rilliet, and Barthez, Dr. Gerhard, and Dr. West. In fact, M. Rufz, and MM. Rilliet and Barthez, both approached very near the truth in regard to these lesions, each comparing them, but the former at an earlier period than the latter, to the condition of the lung of a fœtus that has never breathed. The latter writers, in the article on pneumonia, in their first edition, have described a condition of the lung which differed so much from ordinary pneumonia, as to create a great difficulty in their minds as to its true nature, and to it they applied the term carnification. They were on the very verge of detecting its real character; they did in fact suggest its real character, but were so possessed with the idea that it must be the result of some inflammatory action, as to neglect to pursue their own suggestion, but endeavored to explain the condition on the ground that it was "one mode of termination of pneumonia or else chronic pneumonia." The following passage, quoted from their work (1ère éd. t. 1, p. 74), will show how closely they approached the truth: "The first idea that enters the mind on examining this tissue (carnification), is, that it resembles the lung of a fœtus that has not breathed; we should feel inclined to say that the pulmonary vesicles had not yet been dilated under the influence of the thoracic expansion, and had not, therefore, admitted air into their interior, or, rather, it would seem as though they had been obliterated by some attack of disease, perhaps inflammation, without, however, remaining engorged, and after having lost the power of dilatation."

In the second edition of their great work, MM. Rilliet and Barthez adopt, in great measure, the views of MM. Legendre et Bailly, and of Dr. Gairdner, not only in regard to carnification, but also in regard to the yet more important lesion hitherto generally called lobular pneumonia.

But it is not only the condition of the lung, called carnification, that has been shown to consist, not in inflammation, but in a collapse of the pulmonary tissue. A much more important consequence of the recent researches has been the discovery that in a very large majority of cases the so-called lobular pneumonia, generalized lobular pneumonia, and pseudo-lobar pneumonia of different writers, are also the results of collapse of the lung, variously combined with bronchitic inflammation and congestion of the pulmonary tissue. The latter discovery has lessened very much the importance of pneumonia as a disease of early life, while it has augmented in the same proportion, that of bronchitis, for it has shown that a very large number of cases, formerly regarded as true inflammation of the parenchyma of the lung, are in fact cases of bronchitis combined with collapse of the tissue of the organ.

Now that the nature of collapse of the lung, in connection with bronchitis, and sometimes, also, with true pneumonic inflammation or congestion, has been made known, a number of symptoms occurring in the pulmonary affections of children, which were formerly obscure and irregular, have become easily explicable. It had been often observed that many of the supposed pneumonias of children did not present the same symptoms, pursue the same course, nor require the same treatment as the pneumonia of adults, or as some cases of the disease in children. In a great many of the supposed cases there was an unusually large amount of bronchial inflammation, the general symptoms were much less acute than was to be expected in a parenchymatous inflammation, and what was most singular of all, the physical signs of solidification of the lungs were very variable and uncertain, there being present on one day the signs of simple bronchitis, while on the same day or the following, and over the same region of the thorax, these would be associated with or masked by the signs of induration of the lung; and again in a day or two, the symptoms indicative of condensation might disappear, to be succeeded yet again by those of simple bronchial inflammation. The effects of treatment seemed also to point clearly to a radical difference between the lobular or broncho-pneumonia of children, and the acute phlegmasial disease of adults. It was found, in fact, that depletory measures were seldom borne well in the lobular pneumonia of children, while in the pneumonia of the adult, and in some acute cases occurring in early life, which presented the same general symptoms and the same physical signs as pneumonia in the adult, antiphlogistics, as is well known, are amongst the most successful remedies that can be made use of.

ANATOMICAL LESIONS.—Collapse of the lung (post-natal), occurs in two different forms, the *diffused*, and the limited or *lobular*. The only difference between the two forms is in the number of lobules affected, and their mode of distribution. In the diffused variety, a large number of adjoining lobules collapse, and give a condensed and solid appearance to larger or smaller portions of the lung, most frequently to the edges, merely, of one of the lobes, but at others to the greater part or the whole of a lobe, or even the major part of a lung. In the lobular variety, on the contrary, single lobules or clusters of lobules become collapsed in different parts of a lobe or lung, and the affected portions take the form of irregular, hardened patches or tumors, situated upon the surface, or disseminated through the interior of the pulmonary texture. In the former kind of collapse, the appearance of the altered portion of the lung is somewhat that of lobar pneumonia, and it is to these cases that the terms generalized-lobular, pseudo-lobar, carnification, and splenization, have been applied; while in the latter kind, the isolated, and distinct condensed portions, have been described by the term lobular pneumonia.

The peculiar, or fundamental characters of collapsed pulmonary tissue, are the same in both varieties. I will mention them as succinctly as possible, and then compare them with those of pneumonia, for the reason that it is with the lesions of that disease that those of collapse have been hitherto confounded.

Collapsed lung is generally of a dark violet color, but it may be much darker in tint, and even black, when it is much engorged with blood. Its consistence is always changed; the condensation may amount merely to slight hardening, with a diminution of the crepitation, or it may be very dense with an entire absence of crepitation, in which case portions thrown into water sink rapidly. Though more or less hardened, the tissue still retains a certain degree of flaccidity and suppleness. When cut into, the surface is seen to be smooth and uniform, having somewhat the appearance of muscle, and presenting no granulations. Pressure or scraping cause the exudation of more or less semi-transparent bloody serosity. Close examination shows that the organic elements of the tissue, the vessels, bronchia, cellular tissue, &c., can still be distinctly traced. Lastly, inflation of the lung distends the condensed parts, and gives to them again, more or less completely, their natural physiological characters.

MM. Rilliet and Barthez, in their second edition, treat, at considerable length, of congestion of the lung as a very constant accompaniment, and as a very important element in the state of collapse. They regard this congestion as being connected nearly always with bronchitic inflammation, and as being not merely a passive state, but as exhibiting phenomena, in most instances, which prove it to be in some degree an active condition. They say (*Loc. cit.*, t. 1, p. 428): "We readily acknowledge that a state of debility, prolonged dorsal decubitus, and the obstruction to the circulation thus occasioned, facilitate the production of this condition, and give to it the appearance of a simple passive congestion. But we believe that there exists, moreover (frequently, if not always), a really active and even inflammatory movement." They regard this opinion as proved chiefly by the fact that they have found the texture of the affected parts to be somewhat softened, as shown by the facility with which they are torn by the finger or by scraping with a scalpel; by the swelled and turgid condition the tissues exhibit; by the quantity of sanguineous or sero-sanguineous liquid which escapes on pressure; and by the presence of a serous exudation around the pulmonary vesicles, while the interior of the vesicles appears to be healthy. The last-mentioned condition they found upon their own observation, and upon a microscopic examination made by M. Lebert.

The color is different in the two alterations, being in collapse purple or livid, and in pneumonia brownish-red or fallow-red. In pneumonia the pleura covering the hepatized portions is often covered with false membrane, showing thereby the inflammatory nature of the disease; in collapse this is rarely the case, and only when there is some accidental concomitant pneumonia. The density of the lung in the two conditions is of a different kind: in pneumonia it is hard to the touch, and unyielding; in collapse it always retains a certain degree of flaccidity and softness, like that of muscular tissue. In pneumonia, the diseased part is turgid and swelled, so that it projects above the common level of the surrounding surface; in collapse, on the contrary, it is shrunken and depressed below the neighboring parts. In pneumonia the effects of the inflammatory process on the tissues is very strongly marked, and produces changes in them very different from those occasioned by mere collapse. In that disease the cohesive properties of the pulmonary structure are very much lessened, so that the inflamed parts are readily penetrated by the finger, and are easily torn; in simple collapse, on the contrary, the diseased part is as firm and resisting, or even more so, than in health; whilst in collapse occurring in bronchitis and attended with congestion, though the cohesion of the tissues is somewhat lessened, it is never nearly so much so as in pneumonia. In the true hepatization of pneumonia, a cut surface always presents a granular aspect, while in collapse, on the contrary, it is smooth and even. On scraping a cut surface it is found that, in the former alteration, a plastic, fibrinous matter of a yellowish, orange, or gray color, comes off on the knife, while in collapse only some semi-transparent bloody serosity is scraped off. In the former, the anatomical arrangement of the lobules cannot be seen, as the inflammation attacks indifferently the lobules themselves, the interlobular septa, and parts of neighboring lobules; but in the latter, the alteration can always be seen to be more or less regularly confined to the lobules, the cellular interstices between the lobules remaining more or less apparent; so that in pneumonia the alteration is not bounded at all by the outlines of the lobules, while in collapse the alteration always affects, more or less, the lobular form. To conclude, the effects of inflation are altogether different in the two conditions. M. Legendre (*Recherches Anatom.-Path. et Clin. sur quelques Mal de l'Enfance*, p. 164), states that air can never be made to penetrate by inflation into a completely hepatized lung. Neither in hepatization of the lobar form, nor in true partial hepatization, has he ever been able, even with the utmost effort, to push air into the inflamed tissues. After repeated trials, the tissue remained compact and friable, and sank as rapidly as before when thrown into water. In the fœtal state, on the contrary, the slightest effort sufficed to fill and distend the collapsed air-cells, and to give to the altered portion its natural appearance, excepting that it became more red in consequence of the oxygenation of blood contained in the capillaries. Dr. Gairdner (*Pathol. Anat. of Bronchitis, etc., Edinburgh,* 1850, p. 13–14), remarks that though this test "is very useful in demonstrating the nature of the lesion, in a favorable case, to one not familiar with its character, I do not believe it to be applicable to the determination of the presence or absence of pneumonia in those mixed cases in which alone there is any difficulty." He has observed, in fact, that partially pneumonic lung may be inflated when the affection is recent and combined, as it frequently is, with bronchitic collapse, while in the latter lesion in its purest forms, complete inflation is often very difficult or impossible, after the collapsed state has been of some duration.

The part of the lung in which collapse is most frequently met with, depends somewhat on the form of the alteration. In the diffused variety, it may affect a more or less considerable portion of either or both lungs, but is most common at their posterior part. The lobular variety is most common on the anterior edges, but may, like the diffused, occur in any other part. As a general rule, the alteration is most frequent at the periphery of the organ, where its edges are thin, as along the margins of the lobes, in the languette of the upper lobes, and at the bases of both lungs. The parts just named are those most distant from the primary air-passages; they are those in which the inspired air would arrive last, and with the least force of impulsion.

CAUSES.—It has been generally acknowledged that there are two principal causes by which to explain the production of collapse of the lung. These are the presence in the bronchia of some condition which acts as an impediment to the ready passage of the inspired air, and a want of power in the muscular apparatus by which the function of respiration is carried on. To these Dr. Gairdner adds another,—the inability to cough and expectorate, and thus remove the obstructing mucus, but this is, in fact, included in the preceding.

The most important of the above-mentioned causes is evidently the deficient respiratory power, since this is noticed and insisted upon by all observers. It has been found, in fact, that collapse seldom occurs to any considerable extent except in children who are exhausted and debilitated. The debility may be congenital, it may be the result of wearing diseases, as diarrhœa, hooping-cough, measles, typhoid fever, &c., or it may depend on exposure to unwholesome and enfeebling hygienic conditions. It is easy to understand that a child who is either born weak and feeble, or who becomes so in after years from any of the causes just alluded to, must lose, with the general decay of the strength of the body, some portion of the muscular power by which alone a complete and efficient dilatation of the thoracic cavity can be accomplished, and that, when this is the case, the inspirations must be short and imperfect, and that portions of the lung most distant from the primary air-passages, not being reached by the inspired air, will remain in an unexpanded or collapsed state. If we add to this state of feeble respiratory power, the presence of opposing secretions in the air-tubes, whether these be the consequence of bronchial inflammation, as they are in the immense majority of cases, or, as Dr. Gairdner suggests they may sometimes be, the mere natural secretion of these tubes, accumulated for the want of power to throw them off, it becomes abundantly easy to comprehend the mode of production of collapse in at least some of the examples.

Whether a simple deficiency of inspiratory force alone, without obstructing mucus in the bronchia, will give rise to collapse, is a somewhat mooted point. Dr. West agrees with MM. Legendre and Bailly, in the opinion that it is often due to the inspiratory power having been inadequate to overcome that natural elasticity of the lung which opposes a full dilatation of the organ. Dr. Gairdner (*Loc. cit.*, p. 33) cannot "see reason to believe with Dr. West, that mere debility, apart from any obstruction in the tubes, is a sufficient cause for collapse in the child." He remarks, and with strong show of reason, that the very fact of the lesion being usually more or less lobular, or partial in its distribution, appears to indicate special circumstances of a local kind, as having a marked influence on the production of this affection. What is of most consequence, however, to the working physician, as an important practical truth, is the fact stated by several observers, and adverted to by Dr. Gairdner himself, that in some cases no signs whatever of obstructive bronchitis or of bronchial accumulation can be discovered during life. Before leaving this point, I desire to call attention to the opinion of Hasse (*Pathol. Anat. Syd. Soc. Ed.*, p. 253), that, though this partial introduction of air might be deemed at variance with the laws of respiration, inasmuch as the atmospheric pressure must necessarily distend the entire lung equally, not to the exclusion of a lobe, and still less, to that of a lobule, the objection falls to the ground when it is considered that the operation of these laws is the result of previous muscular action. He refers to the fact that in pleurisy one-half of the thorax, and in partial pleurisy certain portions of that cavity, do not share at all in the movements of the remainder. "We need, therefore," he says, "be at no loss to understand how defective breathing may originate in a merely partial activity of the intercostal or other respiratory muscles."

Dr. Gairdner, as already stated, considers as one of the causes of collapse, an inability to cough and expectorate, and thus to remove the obstructing mucus. The views which he expresses on this point are very interesting, and also, I think, very important. He states that Laennec supposed the expiratory force of respiration to be weaker than the inspiratory, while in fact the experiments of Hutchinson and Mendelsohn, to which he refers, prove that though *ordinary* inspiration is more of a muscular act than *ordinary* expiration, yet the residual effective force for overcoming adventitious obstruction is very considerably greater in expiration. "The *forced* or *muscular* expiratory act is, in fact, about one-third more powerful, as measured by its effect upon a pressure-gauge, than the extreme force of inspiration; and it is this force which is thrown into action when obstruction in the tubes is to be overcome." In the act of coughing, the air in the vesicles is brought to bear upon the obstructing substance within the bronchia, at a maximum amount of outward pressure, and with the additional mechanical advantage of a sudden impulse, so that the practical efficiency of the expiration in forcing air through obstructions must be far greater than that of inspiration. It is clear, therefore, that if the secretions in the air-passages be so abundant or so viscid as to interfere materially with the entrance and exit of air, they must necessarily occasion collapse, either partial or total, of the parts beyond them, since not only does the air enter with difficulty, but being expelled with greater force and in larger quantity than it can be drawn in, the amount remaining in the vesicular structure must gradually diminish. This effect of obstruction will be still more remarkable when the muscular force of respiration is diminished by debility of the patients, for then the inability of the inspiratory act to replace the air driven out by expiration, will be yet more marked than when the muscular powers of the body retain their full force.

There is still another mechanical condition which tends to produce collapse from obstruction, to which Dr. Gairdner refers. This condition is to be found in the form of the bronchial tubes. These tubes are a series of gradually diminishing cylinders, and if a plug of any kind, but especially one closely adapted to the shape of the cylinders, and possessing considerable tenacity, be lodged in any portion of such a cylinder, it will move with much more difficulty towards the smaller end, and in doing so will close up the tapering tube much more tightly against the passage of air, than when moved in the opposite direction into a wider space. From this arrangement of the parts, it will happen that at every expiration a portion of air will be expelled, which, in inspiration, is not restored, owing in part to the comparative weakness of the inspiratory force, and in part to the valvular action of the plug. "If cough supervene, the plug may be entirely dislodged from its position, or expectorated, the air, of course, returning freely into the obstructed part; but if the expiratory force is only sufficient slightly to displace the plug, so as to allow of the outward passage of air, the inspiration will again bring it back to its former position, and the repetition of this process must, after a time, end in perfect collapse of the portion of lung usually fed with air by the obstructed bronchus."

I have been thus particular in my consideration of the causes of collapse, because I am convinced, from personal observation, that it is a subject of very great importance in practice. Many times, in the last few years, I have met with cases of bronchitis, either primary or secondary, in weak and debilitated children, in which the general and local symptoms have pointed clearly to the existence of collapse of the lung, and in which, moreover, the good effects of a sustaining and even stimulating treatment have shown the great utility of an acquaintance with the nature of this affection, and its proper remedies.

SYMPTOMS.—As collapse of the lung occurs almost always in connection with bronchitis, though sometimes, also, after, or concomitantly with pneumonia, it is clear that the symptoms which reveal its existence must be mingled, in a greater or less degree, with those of the two diseases just named. It is true, nevertheless, that it sometimes occurs unassociated with more than very slight evidences of any other disease of the lung. Cases of the latter kind have been usually observed only in children dying in states of utter exhaustion, in whom the muscular power of respiration has been so greatly weakened, as to prevent a dilatation of the thoracic cavity sufficient to carry air into the deeper parts of the lung. In such instances, the symptoms of collapse do not show themselves until a very short time before death, and they consist in the sudden appearance of very rapid and oppressed breathing, with little or no cough, in more or less extensive dulness on percussion over different parts of the chest, but most commonly the inferior dorsal regions, and in feeble or suppressed respiratory murmur, or more commonly a distant and imperfect bronchial respiration. In some cases, however, in which there is very little bronchial complication, as shown by the rarity and small amount of the catarrhal râles, the symptoms of collapse continue with more or less irregularity, as to situation and extent, for periods of several weeks, or even months. But here, also, as in the cases previously referred to, the general debility and low health of the child are strongly marked, and are, with slight variations, persistent. As an instance of this kind of collapse, I may cite the following case, which occurred in my own practice.

A boy, between three and four months old, who, at birth, and up to the time of this attack, had presented every appearance of strong and vigorous health, was seized, on the 3d of October, 1849, with symptoms of a somewhat irregular and anomalous character, but which I soon suspected to be the signs of an intermittent fever. I was induced in part to make this diagnosis, from the fact of my having attended the mother during her gestation of this child, in a severe attack of intermittent fever. At the beginning of the sickness, there was some little coryza, but no cough whatever. On the 3d October, after the coryza had lasted for a few days, he became worse, and I was sent for. During the six days following this, he had one or two attacks each day of coldness of the extremities, followed by violent fever, and ending sometimes with perspiration. He was exceedingly fretful, screamed a great deal, was at times drowsy and dull, and vomited occasionally. The stools were regular and perfectly natural. The breathing was rapid and short nearly all the time, but there was no cough whatever. On the seventh day, the respiration was 100 by the watch, and irregular. The child was pale, weak, drowsy, and entirely without cough. Percussion revealed nothing, and no râles could be heard. On the eighth day, the breathing was 96, and a slight, dry cough was heard two or three times. When roused up, the intelligence of the child seemed perfect. On the ninth day, the breathing was 63, and the pulse 120. There was rather more cough, though still very little, and there was a slight return of the coryza, of which there had been none for several days before. Neither auscultation nor percussion revealed any decided change in the lungs. On the eleventh day, the paroxysms of chilliness, followed by fever, were still noticeable, though there was no clearly marked periodicity in the returns. When without fever the breathing was 54; during the fever it was 67. Auscultation revealed nothing decided. Percussion showed dulness beneath the right clavicle. By the seventeenth day, the intermittent nature of the disorder was more decidedly marked, and under a few doses of quinine the symptoms had improved, so that the breathing fell to 30 during sleep. The cough was a little more frequent, though still very slight, and it was loose. The coryza, also, was more considerable, the nasal discharge being quite abundant.

After this the case went on badly, owing, I think, in great measure, to the circumstance of the quinine being abandoned in consequence of the opposition made by the parents to its administration,—an opposition which I allowed to influence me more than was proper. During November and December, the child remained weak, pale, languid, and with uncertain appetite, sometimes refusing the breast for a whole day at a time. The quinine was suspended at first on account of the great improvement which had taken place in the symptoms, and though resumed afterwards, was given in such small quantities, and for so short a time, for the reasons just mentioned, as to be of no service. In December the child was very ill. It looked badly, having a pale, waxy face, and a dull, languid expression, though without any want of intelligence; it emaciated moderately, and had occasional vomiting; the stools were natural. At this time also, it took the mother's breast with some difficulty, and refused artificial food altogether. Occasionally during this month, there was observed a slight blueness around the mouth, and also about the hands and feet. Late in the month it was attacked with thrush in a slight degree, which lasted several days. In the first week of January, finding that it was fast sinking from refusing the mother's breast and artificial food, a wet-nurse was procured, and for a few days it seemed to improve a little, but this did not last. It grew weaker and thinner, the thrush returned, it had now a good deal of loose cough, the abdomen became somewhat contracted and felt hard and doughy, and the breathing was very rapid, though not greatly oppressed. The child died at last on the 26th of January, having, for ten days before that event, looked wretchedly languid and haggard, and having presented for three days before, slight diarrhœa, loose, frequent cough, entire loss of appetite, thrush, drowsiness, and finally coma.

At the autopsy there were found some fibrinous exudation, and a few adhesions over the lower half of the left lung. The lower two-thirds of the left, and the lower half of the right lung were dark-colored, more dense than usual, not friable, and exhibited no granulations on a cut surface. These portions were in fact collapsed. The upper lobes were spongy, crepitant, and healthy. Not a tubercle was found. The foramen ovale presented an oval-shaped opening, of the size of a goose-quill. The abdominal organs were healthy.

When, as indeed, most usually happens, collapse occurs in the course of bronchitis, it is associated of course with the symptoms of that disease. The bronchitic symptoms have lasted in their usual form for several days, having been marked by sonorous, sibilant, and subcrepitant râles, when suddenly, or in the space of a few hours, the breathing becomes much worse, the pulse rises in frequency but becomes small and feeble, and certain changes take place in the physical signs which are very important. The subcrepitant râle continues to be heard, but it is associated now with prolonged expiration, and a little later with bronchial respiration, which, however, is of a different kind from the bronchial respiration of pneumonia, being distant and smothered, instead of near and metallic, as in that disease. The percussion becomes at the same time, dull and obscure, but never, scarcely, to the same extent as in pneumonia. The general symptoms are those of exhaustion, rather than of high reaction. The surface is pale or slightly bluish, the skin is either natural in temperature, slightly warmer than usual, or coolish, the strength is very much reduced, and the child appears more seriously ill, and particularly more oppressed than the amount of bronchitis present would seem to explain.

As an example of collapse occurring in the course of bronchitis, I will give the following case. A girl between two and three months old, healthy when born and up to the time of the sickness, saving that she was rather paler and smaller than most robust infants, was seized with coryza and slight cough, and after a few days with the symptoms of a mild bronchitis. For two days there was frequent cough, some little fever, quick but not oppressed breathing, occasional sibilant and mucous râle, perfect ability to nurse, and very moderate restlessness or fretfulness. On the third day, without any apparent reason, the symptoms became suddenly very alarming. The breathing became extremely rapid and most violently oppressed, so that the movements of the chest at each respiration were heaving and laborious, the shoulders being lifted high at each inspiration, the outer angles of the mouth drawn downwards, and the alæ nasi widely dilated. There were at the same time abundant subcrepitant, intermingled with dry râles over the dorsum of the chest. In this case, moreover, the symptom mentioned by Dr. Rees, was very well marked. The base of the chest was driven inwards at each inspiration, producing at that point an evident constriction, whilst the upper parts were lifted high in the effort to carry on the respiration. The cough was frequent and racking, and occurred in paroxysms. The child was still and quiet, pale, had a haggard and exhausted look, was unable to nurse at all, and its surface was cool and white, especially that of the extremities. These symptoms continued with very little modification for twenty-four hours, when, under the use of brandy, administered every hour in milk drawn from the mother, of the spirits of Mindererus and paregoric, perfect quiet, and the assiduous employment of mild revellents, they began to moderate, and at the end of another twenty-four hours, the constriction at the base of the thorax during inspiration had disappeared, the breathing was easy and gentle, the extremities had become warm, the child nursed eagerly and abundantly, and with the exception of a slight catarrh, which lasted a few days longer, it was well.

Collapse depending on bronchitic inflammation, in debilitated children, may sometimes last a considerable length of time. In one case, indeed, that I saw a few years since, and of which I published an account (see *Am. Journ. Med. Sci.* for January, 1852, p. 98), the symptoms, owing probably to the fact that the bronchitis causing the collapse was an accompaniment of hooping-cough, continued with slight variations in degree, for a period of about three months, after which the child entirely recovered.

DIAGNOSIS.—The diagnosis of collapse of the lung must always be more or less uncertain where it is of the lobular form, for the reason that the collapsed lobules being disseminated irregularly through the pulmonary tissue, afford no physical sign by which we can detect their condition. The presence of this form ought, however, to be suspected whenever, in a chronic disease, and especially in the course of a catarrhal attack occurring in a feeble and debilitated child, the breathing becomes excessively quick and labored, the skin pale and coolish, when the base of the thorax presents a depression instead of expansion during inspiration, and especially, when these symptoms occur without there being a sufficiently severe and extensive bronchitis to explain their existence.

In cases of collapse affecting a considerable, or the greater part of a lobe, the diagnosis, though still perhaps rather uncertain from the comparatively recent date of the researches into this condition, is much more clear and positive than in the lobular form. In the latter form we are obliged to depend, indeed, almost exclusively upon the rational symptoms, the physical signs being either very slight or entirely null. In collapse of considerable portions of the lung-tissue, we have, on the contrary, some very useful physical signs. These are: the existence of dulness, greater or less, on percussion; feeble respiratory murmur; prolonged expiratory sound, and sometimes bronchial respiration; which, when they occur in connection with, and in the course of bronchitis, are usually quite sufficient to render the diagnosis easy.

The only diseases with which collapse presenting the physical signs just mentioned could be confounded, are pneumonia and pleurisy. From both of these it is usually distinguishable by the absence in collapse, or the slight severity, of the reactional symptoms, by the paleness or blueness and coolness of the surface, by the absence of acute pain, by the greater severity in collapse of the bronchitic symptoms, and by the fact that it rarely occurs except in enfeebled, broken-down subjects, or in those laboring under severe bronchitis. The character of the physical signs, moreover, is different. Though we have dulness on percussion in collapse, it is not so absolute as that either of pleurisy with large effusion, or that of confirmed pneumonia. The bronchial respiration, too, is in collapse, different from that of pneumonia. It is muffled and distant, instead of being clear, metallic, and close under the ear, as in pneumonia. It is in fact more like that of pleurisy. It is heard, too, much more in the expiration than in inspiration, while in collapse is still heard, unlike either pneumonia or pleurisy, an abundant subcrepitant râle. To add to these differences, it is proper to say that in most cases of pneumonia and pleurisy, the course of the disease is much more regular, and the special symptoms so well marked as to leave no doubt as to the real nature of the attack.

PROGNOSIS.—The prognosis of collapse must depend, in great measure, on two circumstances,—the amount of bronchitis which accompanies it, and the constitutional state of the child. When it occurs during the course of extensive bronchitis, as shown by a great abundance and extent of the bronchitic râles, it must add greatly to the danger of that disease; and if, at the same time, the child be weak and debilitated, either from causes long previously in action, or from the severity of the present attack, the risk to life is very great indeed. Collapse is dangerous also, but far from necessarily fatal, in subjects in whom its chief cause has been simple debility. The possibility and the probability of recovery will depend on the hygienic conditions to which the child is exposed, the degree of vital strength it is likely to inherit from its parents, the extent of the collapse as indicated by the severity of the thoracic symptoms, both rational and physical, and the effects of treatment. When the subject can be placed under favorable hygienic conditions, when it has inherited from its parents a good and vigorous hold on life, and when the symptoms of collapse are not very violent, a proper and rational treatment will in all probability save it, while, under opposite circumstances, the chance of recovery would be very small, if there were any.

Treatment.—The treatment of collapse, or post-natal atelectasis, must vary somewhat in different cases. One general rule will apply, however, to all; this is to employ a sustaining and strengthening system of medication, to the exclusion of all exhausting means.

In cases which are entirely, or almost entirely, independent of bronchitis, the most important measures to be attended to are the regulation of the temperature in which the child is kept, of the clothing, and of the diet, the use of mild stimulants and of tonics, and the external employment of revellents. The child ought to be kept in a warm, even temperature, one from 70° to 75°; it should be clothed in soft flannels, and its diet ought to be nourishing and strengthening. If at the breast, we should be sure that the milk is of a good quality, and that the nurse has an abundant flow. If weaned recently, it ought to have, if possible, a wet-nurse, and so also if it be supposed that the mother has too little milk, or that this is not perfectly healthy. If permanently weaned, the diet should be so arranged as to give to the child what is at the same time easy of digestion and nutritious. In a severe case, coming on suddenly, the most suitable internal remedies are brandy, in small doses, frequently repeated, Huxham's tincture of bark, the spiritus Mindereri or the aromatic spirits of hartshorn, and small doses of quinine or extract of cinchona. In slower and more chronic cases, we must depend on a well-selected and nutritious diet (and food ought to be given almost by force, or at least it should be urged strongly on the child), on warm clothing, and on the use internally of brandy, quinine, the citrate of iron and quinine, pure metallic iron, the iodide of iron, Huxham's tincture of bark, or some such remedy. In sudden cases, the best revellents are the following: mustard, weakened by admixture of flour or Indian meal, and applied once in three or four hours; a plaster made of suet or simple cerate grated over with nutmeg; or liniments composed of ammonia, spirits of turpentine, or oil of amber, mixed with sweet oil. In chronic cases, the Burgundy pitch, or compound Galbanum plaster, made somewhat weaker than those used for adults, should be applied over the front and back of the chest, or we may rub the thorax twice a day with any ordinary ammonia liniment, made, if necessary, rather more irritating than usual by the addition of some oil of monarda. The daily use of a gentle emetic of ipecacuanha has been recommended, and supposed to prove useful, by emptying the bronchia of their secretions, and also by the fact that its operation induces several deep inspirations, and in that mode promotes the better performance of the respiratory act. I have never employed the emetic except in cases accompanied with a good deal of bronchitis and consequent accumulation of mucus in the air-tubes, and not then when the prostration was very great. In fact, the operation of any emetic is sometimes productive of so much exhaustion of the strength, as to cause me to hesitate in prescribing a remedy of that class; though I can fully understand that the act of vomiting, if not followed by too much prostration, could scarcely fail to prove beneficial in collapse, by the strong efforts at breathing which it gives rise to, and also by the succussions it must impart to the lungs through the medium of the diaphragm.

In cases of collapse occurring in the course of, or towards the termination of severe bronchitis, the treatment must resemble a good deal that which I have just described as proper for the same condition, when it exists unassociated, or associated only to a slight extent, with that disease. When the symptoms of imperfect expansion appear towards the termination of, or after the patient has partially recovered from bronchitis, and when of course the strength is more or less reduced by the severity of the previous acute sickness, and also perhaps by the necessary measures of treatment, the case ought to be managed very much in the same way as has just been recommended for those in which the collapse was caused chiefly by exhaustion, and less by the presence of obstructing secretions, in the bronchia. Nourishing, but very light and digestible food, mild stimulants, as small quantities of brandy, wine-whey, the bitter tinctures, iron, or quinine, with counter-irritants to the surface of the chest, warm clothing, and repose, constitute the necessary and most reasonable remedies. When, on the contrary, the atelectasial condition supervenes in the midst of extensive and severe bronchitis, we are called upon to treat at the same moment two morbid states, one consisting of active inflammation, and another of want of power in the muscles of respiration to force the atmospheric air through the secretions which are obstructing the air-passages. Under these circumstances, there is almost always associated with the bronchitis, as we shall find when we come to treat of that disease, more or less intense congestion of the collapsed portions of the lungs. We must employ, therefore, such remedies as tend to modify the inflammation of the bronchial mucous membrane, and diminish thereby the amount of secretion poured into the air-passages, such as may serve to expel mechanically those secretions, and those which shall unload the congested lung of its excess of blood, always taking care, in our selection of the agents to accomplish these ends, to choose those which are the least perturbative and exhausting. To moderate the inflammation of the bronchial mucous membrane, we may employ dry cupping, or, if the patient be not too much reduced, wet cupping or leeching, but these latter with great moderation. For the same purpose, and with a view also to unload the congested parts of the lung, counter-irritation is very important, and the best mode of effecting this is by the repeated application of dry cups, or of mustard poultices, consisting of one-third mustard to two-thirds

Indian meal or flour, and by mustard foot-baths. The poultices ought to be applied first to the dorsum and then to the front of the chest, once in every three or four hours, and they should be made large enough to cover a considerable portion of the thoracic walls. Counter-irritation, assiduously made use of, is, I believe, one of the most, if not the most effectual means of treatment in the case. Emetics ought to be given twice a day, or even three times, if they do not reduce the strength too much. The best are those which operate with the least subsequent prostration, such as ipecacuanha or alum. When they are found to exhaust much, and to increase thereby the labor of breathing, their use must be suspended.

After emetics, or when these cannot be used, the remedies from which I have obtained the greatest benefit are the liq. ammon. acetat., and seneka, either in decoction or syrup, combined sometimes with small quantities of opium. To a child two years old I should give twenty drops of the acetate of ammonia solution, with ten of the syrup of seneka, or with a teaspoonful of decoction of seneka, every two hours. When the cough is paroxysmal, painful, and harassing, about ten drops of paregoric, half a drop or a drop of laudanum, or from four to six drops of solution of morphia, may be added to each dose of the spiritus Mindereri and seneka. The opiate ought to be continued until the cough and restlessness diminish, and then suspended. In all these cases, there should be no hesitation in giving small quantities of brandy or wine-whey, whenever the symptoms of prostration are so marked as to indicate immediate danger;—when the pulse is very rapid and small, when the skin is cool or pale and bluish, and when the general aspect of the patient, and the convulsive and labored character of the breathing, show that the muscular strength of the child is scarcely sufficient to carry on the function of respiration.

ARTICLE II.

PNEUMONIA.

Definition; Synonymes; Frequency; Forms.—The term pneumonia is now, by universal consent, applied only to inflammation of the parenchymatous structure of the lungs. It is often called, in this country, catarrh-fever, lung-fever, or inflammation of the lungs.

It is one of the most frequent, and, therefore, one of the most important of the acute diseases of childhood. Dr. West, in a paper on the pneumonia of children (*Brit. and For. Med. Rev.*, April, 1843), informs us that the English tables of mortality show pneumonia to be the cause of a larger number of deaths in childhood, than any other disease, with the exception of the exanthemata. From the third report of the registrar-general, he quotes the facts, that of all the deaths in the metropolitan districts under fifteen years of age, 13·6 per cent. were from pneumonia, 13·0 per cent. from convulsions, and 5·4 per cent. from hydrocephalus. He obtained nearly similar results from an examination of the returns from Manchester, Liverpool, and Birmingham. In the Philadelphia bills of mortality, the distinction between pneumonia and bronchitis is so imperfect, that it is impossible to obtain data on which to found an exact standard of the relative frequency of pneumonia and other diseases. It appears, however, not to be so fatal here as in England, since of 18,599 deaths under fifteen years of age in this city, during the five years from 1844 to 1848 inclusive, only 1,385, or 13·4 per cent. were from pneumonia and bronchitis combined.

Any one who will study with attention the various doctrines in regard to pneumonia and bronchitis that have been set forth in the different works on the diseases of children published in the last fourteen or fifteen years, will most assuredly acknowledge that there are few diseases about which there prevails so much diversity of opinion as to the real nature of the lesions forming the essential anatomical characters of the disorder, and, as a consequence of this, so much doubt as to the proper mode of classifying and describing them. From the time of the appearance of the works of M. Valleix, M. Barrier, Dr. Gerhard, and especially that of MM. Rilliet and Barthez, up to the moment of publication of the essay of MM. Legendre and Bailly (referred to in the article on atelectasis), it was commonly believed that inflammation of the parenchyma of the lung exhibited in children very different characters in the majority of the cases, from those which marked the pneumonia of the adult. Two principal forms of the disease were therefore described by most writers,—the *lobular* and the *lobar*. The former was supposed to be almost peculiar to children, and to occur only on rare occasions in adults; the latter was held to resemble, in almost every respect, the pulmonic inflammation of the adult. Moreover, lobular pneumonia was generally believed to be by far the most common form assumed by the inflammation in children under five years of age, whilst lobar pneumonia was thought to be comparatively rare under the age mentioned. Besides these two chief varieties of pneumonia, two others have been described under the names of *vesicular* and *marginal* pneumonia, while to yet another MM. Rilliet and Barthez applied the title of *carnification*.

The researches of MM. Legendre and Bailly have caused a great revolution in the views of a large number of medical observers and writers. These gentlemen assert (as stated in the article on atelectasis) that a very large proportion of the cases heretofore described under the titles of lobular pneumonia, generalized lobular pneumonia, pseudo-lobar pneumonia, marginal pneumonia, and the carnification of MM. Rilliet and Barthez, are in fact cases of bronchitis variously associated with congestion and collapse of the tissue of the lung. They themselves describe these supposed different forms of pneumonia under the title of *catarrhal pneumonia*. But, though they are opposed to the opinion of lobular pneumonia being a true inflammation of the lung, they do not assert that children are not subject, like adults, to regular inflammation of the pulmonary parenchyma. They describe, in fact, as nearly all others have done, a *lobar* pneumonia, which exhibits the same anatomical characters, and very nearly the same train of symptoms, both rational and physical, as the pneumonia of adult life; and a *partial* pneumonia, in which the inflammation, instead of invading a large part of a lobe or a whole lobe, attacks isolated small portions of the parenchyma, so as to present an appearance of nodules of inflammation scattered here and there through the healthy tissue.

Since the publication, in 1844, of the views arrived at by MM. Legendre and Bailly, numerous other observers have repeated and continued their researches, but with very different results. Some have adopted their opinions entirely, others in part, while others again adhere tenaciously to the old doctrines. Amongst those who now believe that lobular pneumonia in its different forms is in fact bronchitis with collapse of the lung-tissue, and not inflammation of the pulmonary parenchyma, the most important are Drs. West and W. T. Gairdner (*Loc. cit.*), MM. Hardy and Behier (*Pathol. Int.*, t. ii, p. 529, et seq.), MM. Rilliet and Barthez, in their second edition, and Dr. Fuchs (*Brit. and For. Med.-Chirurg. Rev.*, July, 1850, p. 154, et seq.). Amongst those who oppose the new views, I may mention the names of M. Bouchut, and those of the authors of the *Compendium de Médecine Pratique*. I would refer any one who desires to study this matter as treated by English hands to the essay "On the Pathological Anatomy of Bronchitis, and the Diseases of the Lung connected with Bronchial Obstruction," by Dr. W. T. Gairdner, of Edinburgh. It is decidedly the best English work on the subject I have seen, for it treats not only of atelectasia in children, but contains yet more numerous observations upon the same condition as it occurs in adults. The second edition of MM. Rilliet and Barthez, is also very full on this subject; those authors adopting in great measure, as above stated, the views of MM. Legendre and Bailly.

My own opportunities for investigating this interesting subject by post-mortem examination are so few, owing to the small amount of mortality that occurs in a private practice, limited almost exclusively to the easy classes of society, and also to the prejudices which many hold against autopsies, that I have been obliged to form my conclusions in regard to it chiefly from a study of the researches of others, and from a comparison of the symptoms which I have observed during life in the different pulmonary affections of children, with those researches, and with the results I have obtained from the few autopsies that I have been able to make. Assisted by these combined means of forming a conclusion upon the subject, I have been led to the belief that the former method of dividing the pneumonia of children into the two forms of lobular and lobar, is incorrect, and I have determined to substitute for the term lobular that of *partial*, which is the one employed by M. Legendre, and very lately also by Dr. Alois Bednar (*Die Krankheiten der Neugebornen und Säuglinge*, Dritter Thiel, Wien, 1852, p. 65), while I shall describe the other form of the disease under its usual title of *lobar*. Of these two forms, the latter is much the most frequent, though it was formerly thought that the lobular was more common than the lobar variety, simply from the fact that bronchitis attended with lobular collapse (the condition heretofore almost always described as lobular pneumonia) is much oftener met with in children than true pneumonia, either lobar or partial.

PREDISPOSING CAUSES.—It is generally believed that pneumonia is most apt to occur in the course of other affections. This is certainly true in regard to the disease as it prevails in hospitals, and probably amongst the poorer classes of society also. MM. Rilliet and Barthez state that of two hundred and forty-five cases observed by themselves, only fifty-eight, or very little more than a fourth, occurred in children previously in good health. The proportion of secondary cases is much smaller in private practice, since of thirty-seven cases of well-marked pneumonia, observed by myself during the last four years, only four were secondary. No doubt one cause of this apparent discrepancy between the authors mentioned above and myself, is the fact that I have left out of consideration all the cases in which the pneumonic symptoms were not entirely clear, thus putting aside a number of cases which they would have classed as lobular pneumonia, but which I prefer to regard as examples of bronchitis with collapse. *Age* forms a strong predisposing influence. Of the two hundred and forty-five cases above quoted, one hundred and seventy-two occurred under five years of age. Dr. West (*Loc. cit.*) says, that during the first five years of life, the cases of pneumonia were in the proportion of 10·3 per cent. to the total of diseases, while in the succeeding five years they were in the proportion only of 1·3 per cent. These statements do not agree with my own experience, since of the thirty-seven cases that I have seen, nineteen occurred under five, and the remaining eighteen between five and eleven years of age, showing that the frequency in the first five and the subsequent six years of life is very nearly the same. True pneumonia is less frequent in private practice in the first two, than in the succeeding years of life. Of the nineteen cases that occurred in the first five years after birth, two occurred in the first, and three in the second year, while five occurred in the third, four in the fourth, and five in the fifth year.

Sex.—A larger number of cases occur in boys than girls. The excess is little more, however, than may be accounted for by the preponderance of male over female children. Of the thirty-seven cases just referred to, nineteen occurred in boys, and eighteen in girls.

Constitution.—It is doubtful whether constitution has much or any influence upon the liability to the disease. Dr. West says that weak health is not a predisposing cause according to his experience. I am convinced that it attacks strong and vigorous children more frequently than those of more delicate constitution. In children of feeble health and weak stamina, the very same causes which produce pneumonia in the robust, give rise to bronchitis.

Season.—The disease is most prevalent during the winter months. According to the third report of the registrar-general of England, the greatest mortality under fifteen years of age takes place in December.

Previous Diseases.—It is apt to occur as a complication of all the diseases of children, and most frequently in measles, pertussis, typhoid fever, enteritis, and bilious remittent fever.

EXCITING CAUSES.—The continued action of some of the predisposing causes must be regarded as the exciting cause in the majority of the cases. External violence, as a severe fall, or a blow upon the chest, will sometimes act as an exciting cause. The action of *cold* is almost always alleged to be the immediate cause of the attack. M. Grisolle states that it is impossible to determine the exciting cause in more than a fourth of the cases, and that in nearly all of these it is cold.

ANATOMICAL LESIONS.—*Lobar* pneumonia in the child is marked by the same physical characters as in the adult. The three stages of the inflammation, engorgement, red hepatization, and gray hepatization, exhibit the same alterations of the tissues as in adult life. Moreover, the three stages occur with about the same frequency in early as in later life. Dr. West (*Loc. cit.*, 2d ed., p. 189) shows that the third stage occurs very nearly as often in children as in adults, he having met with it in the former in the proportion of sixty-eight per cent., while M. Grisolle found it in seventy-two per cent. of the latter. The chief difference in the disease, as it exists at the two ages, consists in the more frequent co-existence of all three of the stages in the young subject.

In the first stage, or that of engorgement, the affected portion of lung is distended, so that it does not collapse in the same proportion as the healthy portions, when the thorax is opened. It is heavier than usual, so that it sinks somewhat in water; it is of a brownish-red color; it pits upon pressure, and crepitates less than healthy lung, the crepitation being observable only here and there. The natural degree of cohesion between the tissues is somewhat diminished, so that the diseased portion is much less tough and elastic, and more soft and friable than it ought to be. When cut into a large quantity of frothy, and more or less deeply tinged sanguineous fluid escapes.

In the second stage, or that of red hepatization, the lung is increased in volume, so that it continues to fill the side of the chest after that cavity is opened; it is dense and hard, has ceased entirely to crepitate, from the fact of having become completely impermeable to air, and sinks rapidly when thrown into water. Externally, the diseased portion is of a deep red color, while internally the same color is observed, but often of such different shades, as to give to a cut surface a marbled aspect. The cohesion between the tissues is, in this stage, much less strong than in health, or in the first stage of the disease; the finger penetrates the lung with some ease, and the texture can be crushed between the finger and thumb. When cut into, there escapes a non-aerated and reddish fluid, which is much less abundant than in the first stage. The most important feature of red hepatization is, however, the granular character of an incised surface. This granular appearance is produced by the presence of numerous flat granular elevations, which seem to consist of effused matter that has been thrown out in the air-vesicles. It is best seen by examining a torn surface of the lung.

In the third stage, or that of gray hepatization, the lung continues to exhibit the same volume, density, impermeability to air, and consequent total absence of crepitation, as in the second; but the process of softening has made still further progress, so that a portion of the lung may be squeezed with the greatest ease between the finger and thumb into a pulp. The color has now changed from deep red to a dirty light gray, or a pale straw yellow. When incised, the surface still presents a granular appearance, but the granules are more irregular, and flatter. The diseased portions are now infiltrated with a purulent fluid, which escapes in considerable quantities in the form of a yellowish-gray liquid, whenever the lung is cut into. Careful examination in this stage shows that the organic elements of the lung are reduced to a homogeneous mass, the only parts which remain distinct being the larger vessels and bronchia.

The anatomical lesions which characterize *partial pneumonia* occur under two conditions. In one, the alterations are exactly the same as those of the lobar form, the only difference between the two being that in the partial form the hepatization affects distinct patches of the pulmonary substance, producing, therefore, hard nodules of hepatization, scattered through healthy tissue. These nodules are irregular in form, and imperfectly circumscribed, but present, like the lobar form, the three stages of the inflammation,—engorgement, red hepatization, and gray hepatization. The second variety of partial pneumonia is characterized by patches of hepatization, varying in number from fifteen to thirty, and in size from that of a hemp-seed to that of a pigeon's egg, which are more or less spherical in shape, hard to the touch, and exactly limited. M. Legendre states that these hepatized points become transformed into a grayish, rough, and uneven substance, of a fibrous appearance, a change which takes place at different points of the diseased mass, sometimes in the centre only, sometimes in their whole extent, and at others on their circumference.

Abscesses are not very uncommon in the pneumonia of children. They occur as a result of the third stage of the disease, so that in the same lung may be observed the first, second, and third stages of the inflammation, and abscesses. The cavities of the abscesses are generally circular, sometimes oval, and they measure from half a line to an inch or more in diameter. Sometimes the abscess is multilocular, each of the purulent cavities being partially separated from its neighbor by a wall of hepatized tissue. They are found in various parts of the lung, but seem disposed, generally, to approach the surface of the organ. When the latter event happens, adhesive inflammation between the pleura pulmonalis and costalis usually takes place, but should this fail to occur, the abscess ruptures into the pleural sac, and produces pneumothorax. MM. Rilliet and Barthez met with two examples in their autopsies, in which this accident had occurred, and they report another case in which it occurred during life, and in which the child recovered. I have met with one case of pneumothorax myself, produced in the same way. It occurred in a boy eleven years old, during an attack of secondary pneumonia complicating a severe bilious remittent fever. The patient recovered entirely, after a most violent illness.

I am desirous, before closing my remarks on the anatomical lesions of the disease under consideration, of drawing attention to the subject of simple uninflammatory congestion of the lung, for the reason that the latter has no doubt, especially when associated with collapse of the pulmonary tissue, been frequently mistaken for pneumonia.

Congestion of the lung occurs either in the lobular or lobar form, the distinction between the two being the same as that between lobular, and diffused or lobar collapse. When lobular, the lung presents, generally along the posterior edge of the organ, disseminated lobules, distinctly circumscribed by the inter-lobular cellular septa, which are rather protuberant than depressed, more friable, and of a lighter purple color than collapsed lobules, and which afford, when squeezed, a considerable quantity of frothless bloody fluid. In very young infants, the congestive disposition often assumes the lobar or diffused form, and is supposed by M. Legendre to have frequently been taken for pneumonia. In this variety of congestion, the affected portion of the lung is increased in size, and is distended and gorged with fluids. The color of the congested part varies from a light to a dark purple, or almost blackish tint. The cohesion of the lung is also variable, the differences depending on the degree of the congestion. When this latter is very great, the part is very friable, while it is much less so under the opposite condition of things. Though the lung is harder in this state than natural, it still retains a certain degree of flaccidity which does not exist in true hepatization. Pressure causes an abundant exudation of blood and serosity from a cut surface, and the latter, instead of being granulated, as is always the case in hepatization, is smooth and even. Neither does the lung exhibit any granulations when it is torn. Lastly, inflation distends all the vesicles, and gives to the condensed parts their natural lightness and their rosy color, though, be it remarked, the development of the diseased parts under the operation is not complete and entire as in collapse, in consequence, no doubt, of the large amount of blood they contain.

Inflation of the lung after death has been much employed of late, as any one who has read the previous remarks on atelectasia must have seen, as a means of distinguishing between pneumonia and collapse. It was there stated that, whilst inflation distended, and restored more or less completely to their natural condition, parts of the lung that were merely collapsed, it failed almost entirely to have any effect on parts of the lung affected with true pneumonia. It is easy to understand why inflation should fail to exert much effect on inflamed lung, at least when the disease has reached the stage of hepatization. In fact, the tissues comprising the lung are glued together and hardened by a deposit of plastic lymph, poured out both on the outside and inside of the air-cells, so that it becomes impossible to force the air into the midst of the agglutinated structures. In the first stage of pneumonia, that of congestion, inflation will distend in some degree the affected portions, but, in the second and third stages, not even the strongest force has any effect on the impermeable vesicles.

Lobar pneumonia is stated by most authorities to be generally confined to one lung, and such has been my own experience in regard to it, since of thirty-six cases in which its location was carefully determined, it was unilateral in thirty-four, and double only in two. It is much more common on the right than left side, according to most writers. In the thirty-four cases just referred to, the distribution was exactly equal, the disease being seated seventeen times on the right side, and the same number on the left. It attacks the lower lobe much more frequently than the upper. Of thirty-three cases in which this was determined, the upper lobe was the part affected in thirteen, while in twenty the base of the lung was the seat of the disease. Of the thirteen cases of inflammation of the upper lobe, in nine it was seated on the right, and in four on the left side. Of twenty cases occurring in the lower lobes, seven were on the right, and thirteen on the left side. In the two cases of double pneumonia, the inflammation attacked the lower lobes of both lungs in one, while in the other it attacked first the base of the left lung, and afterwards the summit of the right.

The statements just made as to seat of the pneumonic inflammation in the cases that have come under my own observation, do not, I am well aware, agree exactly with the experience of other observers. Dr. West, for instance, found (*Loc. cit.*, p. 190) that double pneumonia preponderated greatly, in early life, over those wherein only one lung suffered. This, it will be observed, is widely different from the result of my experience, and it is also directly opposed to that of MM. Rilliet and Barthez, Rufz, and Barrier.

M. Barrier, in fact, cites (*Mal. de L'Enfance*, t. i, p. 286) one hundred and forty-four cases of lobar pneumonia as having been observed by the authors just mentioned, and by himself, and of these only fifteen were double. My results in regard to the frequency of double lobar pneumonia agree, therefore, with those of the authors last mentioned, but they differ as to the relative frequency with which the two lungs are attacked. Thus, in my cases, the inflammation occurred with equal frequency in the two lungs, whilst of one hundred and twenty-nine cases of unilateral pneumonia observed by the above authors, eighty-four were seated in the right, and forty-five in the left lung. These writers state, as most others do, that pneumonia of the lower lobe is more common than that of the upper lobe. This tallies with my observations, but, as it seems to be a general opinion in the profession that inflammation of the summit of the lung is rare in comparison with that of the base, I wish to call attention again to the fact stated above, that of thirty-three cases, in which I ascertained accurately the seat of the disease, it was in the upper lobe in thirteen, and in the lower in twenty.

It was formerly supposed that *bronchitis* was an exceedingly frequent accompaniment of pneumonia, and there is no doubt that such is really the fact in a much larger proportion of the cases that occur in children, than of those that occur in adults. But, since the discovery of the nature of the anatomical alteration, which we have described under the title of collapse or atelectasis, it has become clearly evident that one reason why it was thought that bronchitis so generally accompanied the pneumonia of children, has been that a large number of cases, heretofore classed as pneumonia, were in reality cases of bronchitis attended with collapse. It has been shown, indeed, in the preceding pages, that there is good reason to believe that a very large majority of the cases hitherto described as lobular pneumonia, ought to be classed under the head of bronchitis. Now, these cases are precisely those in which bronchitis has been found to occur so constantly, and to form so large a portion of the disease, and they, moreover, have always been stated to be of much greater frequency than cases of lobar pneumonia. If, however, we conclude to regard what was formerly called lobular pneumonia, as bronchitis with collapse, and to restrict the title of pneumonia to the cases in which there is a true hepatization of the lung, we shall have left only lobar pneumonia, which is not at all a rare affection, and partial pneumonia. Now, in the lobar pneumonia of children, as in that of adults, bronchitis does not usually exist to any very considerable extent, and we may state, therefore, that, though bronchitis exists to a greater or less extent in most of the pneumonic cases of children, it is in a much less severe degree than was at one time supposed.

When bronchitis is present it varies from simple increased vascularity with augmented mucous secretion, to intense congestion with purulent or pseudo-membranous secretions.

Pleurisy is a frequent complication, as it is found to exist in about half the cases.

Emphysema is another common complication. It generally occupies the upper part of the lung, or its free edge, and is found most strongly developed in the lung which presents the greatest amount of inflammation, or in both, when both are inflamed. Its degree depends on the extent of the pulmonary inflammation and bronchitis, and the severity of the dyspnœa. The vesicular form is much more frequent than the inter-lobular.

SYMPTOMS; SKETCH OF THE DISEASE; COURSE.—In order to present a faithful account of the disease, a general sketch of the symptoms will first be given, after which the most important ones will be considered separately under the head of particular symptoms, so that the reader may first obtain a notion of the course of the disease, and then become intimately acquainted with its details and peculiarities by reference to the remarks on each particular symptom.

True pneumonia, with well-marked hepatization, is not, according to my experience, a common affection in young infants in private practice, since out of thirty-seven cases of the disease that I have met with in children, only two occurred in infants within the first, and three in the second year. Of the two cases within the year, one occurred in a child six weeks old, and the other in one seven months.

In *new-born children, and those still at the breast*, pneumonia very generally begins with more or less marked symptoms of bronchitis, though in some instances it commences suddenly, as it does in adults, without any previous sign whatever of bronchial inflammation. When it occurs during an attack of bronchitis, the symptoms which belong to the pneumonic inflammation will, of course, have been preceded by those which depend on the disease of the bronchial mucous membrane. In these cases, the development of the pneumonia will be indicated by an aggravation of the general symptoms, by an increase of the oppression, by the fact that the cough and breathing both become more painful than before, and by the occurrence of the physical signs peculiar to pneumonia, or, in other words, by the symptoms which depend upon and mark a state of inflammation of the parenchyma of the lung. Of these I shall now give an account.

When pneumonia appears as a primary affection in young children, without preceding bronchitis, as sometimes undoubtedly happens, though much less frequently than in children over five years of age, and especially than in adults, the attack is usually sudden. The first symptoms observed are restlessness, peevishness, disposition to cry, a diminished appetite for the breast, and feverishness. These symptoms are most marked in the evening and night. From the very first, or by the second day at least, cough is heard, and careful examination of the breathing will show that it is somewhat hurried. The cough is dry, short, and hacking, at first, and not very frequent, but it soon becomes louder, fuller, more straining, and especially it becomes painful. The fact that it is painful may always be ascertained by watching the motions of the child, its cry, and the expression of the face. We can always perceive, even in an infant, a disposition to restrain the cough, to smother it, a struggle to make it short and sudden, when it causes sharp pain. At the moment of the cough too, a marked expression of pain, a kind of sudden grimace or twisting of the features, may always be observed, which is accompanied or followed instantly by a loud, sharp cry, or a spell of crying. This grimace of pain, with the accompanying cry, I have never observed in their most characteristic form in simple bronchitis, but only in pneumonia and pleurisy. I have twice seen these symptoms so decidedly marked, that they could not fail to have drawn any one's attention; once in an infant six weeks old, who died of a most violent and extensive pleuro-pneumonia, and again in a child thirteen months old, who died of pleurisy resulting in a deposit of pure pus in the pleural sac. The nature and extent of the lesions were ascertained, in both cases, by examination after death. The presence of pain in the side is shown also by the fact that full inspirations, caused by changing the position of the child, and those which occur during fits of crying, occasion a sudden arrest or stoppage, so to speak, of the act of inhalation, which gives to the crying, and often also to the breathing, a sobbing character, while across the countenance passes at the same moment the expression of pain already referred to. The breathing, which is only slightly disturbed at first, soon becomes frequent and attended with more or less effort, and gives rise to an unusual play of the nostrils, a symptom which ought always to attract attention to the respiratory system as the seat of disorder. It interferes also with the act of nursing, so that whether the child takes the breast less frequently than usual, from want of appetite, or seeks it with greater avidity than common, from thirst, the act of sucking is attended with some difficulty. The infant seizes the breast for a few instants, then lets go in order to breathe more easily and seizes it again; or it drops the nipple suddenly and begins to cry, as though the act of sucking were painful from the necessity it begets of taking occasionally a fuller and deeper inspiration than usual. As a general rule, the bowels are torpid, while vomiting, which is rather unusual in older children, is quite common in young infants.

When the disease is once established, whether it have been preceded by bronchitic symptoms, or occur as a primary affection, the symptoms are generally well marked, so as to leave but little difficulty in the recognition of the disorder. The child now loses all gaiety and cheerfulness and becomes either dull and listless, or very restless, peevish, and troublesome. Young infants generally lie quietly on the bed, or in the lap, merely fretting and crying when they cough, or when they are moved for any purpose, while children of several months old, and those in the second year, are usually very cross and restless, crying and screaming when anything is done for them, and insisting upon being frequently moved from the cradle or bed to the lap, or from the lap to the cradle. As a general rule they are contented only upon the lap, always crying to get back when they are removed from it to the cradle or crib. In some instances, however, they, like young infants, are quiet and dull, being content to lie still when placed in a comfortable position, and crying only after coughing, for the breast or drink, or when disturbed.

A febrile reaction now displays itself in full force. The skin becomes hot and dry, and the pulse frequent, rising to 150 and 160 or higher, in infants, and to 140 and 150, or even 160, in those of several months old. The dyspnœa becomes more and more evident. The respiration rises to 60, 70, 80, or even higher. In a case of pleuro-pneumonia at six weeks of age, I counted it at 128. The breathing is at the same time more or less labored and difficult, the alæ nasi being seen to dilate spasmodically at each inspiration, while the motions of the chest, and especially those of the abdomen are much stronger and more active than in healthful respiration. The cough is now more frequent than before, evidently painful, and usually dry, though sometimes a slight degree of looseness may be detected in the sound which it occasions.

Percussion now reveals manifest dulness over the seat of disease, which is usually the base, though not at all unfrequently the upper region of one side. When the disease is double, which is oftener the case, as already stated, in children, than in adults, though not so often as has been supposed by some, the percussion will be dull of course over the inferior regions of both sides behind. Together with the dulness of sound on percussion, and sometimes when this is faintly marked, there is an evident diminution of elasticity of the walls of the chest, and this becomes therefore an important symptom, especially when dulness on percussion is absent. The dulness on percussion is not, however, so marked a symptom in infants as in adults, from the fact that the natural sonoreity of the chest is so much greater in the former than the latter.

Auscultation reveals over the diseased part distinct and abundant fine subcrepitant râle, but the crepitant râle or fine crepitation, which is the pathognomonic sign of pneumonia in adults, and which in them is rarely wanting, is absent in young children, or is heard only when they make deep and free inspirations. It is most apt to be heard in young children during the deep inhalations which they make just before crying, or during the act of crying. It is, therefore, much less constant, less strongly marked, and more fugitive, in children than in adults, and is, in the former, replaced in good measure, by a fine subcrepitant râle. In connection with these symptoms we always have more or less well-marked bronchial respiration. This may be pure, which is rarely the case; it may be, as usually happens, associated with crepitant or subcrepitant rhonchus, or it may be heard only in the expiration.

The symptoms above described show that the inflammation has reached the second stage, or that of red hepatization. After attaining this point, the disease usually remains stationary for a few days, and then either subsides, in favorable cases, by the resolution of the inflammation, or in unfavorable cases, terminates fatally in this stage, or else passes into the third stage, and causes death by a more or less extensive suppuration of the lung. In favorable cases, which are said to be rare in very young infants, but more common in those several months old, and in the second year of life, the severity of the symptoms gradually diminishes. The fever subsides, the pulse becoming less frequent, and the skin cooler and less dry; the breathing becomes easier and slower, and is attended with less pain; the cough grows looser, less frequent, less difficult, and ceases to be painful; the child begins to nurse without pain and with greater ease and facility; the restlessness and fretfulness, or the somnolence, when that has been a marked symptom, diminish, and the child becomes more placid, and sleeps quietly and tranquilly. The chest is now less dull than before on percussion; the bronchial respiration begins to diminish in intensity, and is very much masked by the subcrepitant râle, which becomes more and more evident, until at last it takes the place entirely of the bronchial breathing. The symptoms continuing to amend, the physical signs of the disease cease at length to be perceptible, the cough grows more and more loose and rare, the countenance becomes natural, the fever ceases, and convalescence is fully established.

In unfavorable cases, death may occur rather suddenly in the second stage, without any very decided change in the physical symptoms, from exhaustion or from the supervention of collapse of portions of the lung-tissue. In these cases, the breathing becomes more and more rapid and labored, or it becomes slower than before; the moist râles increase in abundance and extent, while the percussion often remains about the same; the difficulty of sucking increases, so that the child, when put to the breast, attempts to draw but two or three times, and then lets go exhausted and distressed, or it makes no effort whatever; the cough becomes less frequent, but is still painful and difficult; the skin grows pale and white, excepting about the face, hands, and feet, where it assumes often a bluish or cyanotic hue; the extremities, and often the face too, become cool; the child becomes exceedingly restless, and then dull and perfectly quiet, or comatose, and death at last occurs from asphyxia. In another class of cases, which, however, are much more rare in very young children than in older ones, the disease passes into the third stage, or that of suppuration. In such cases the febrile symptoms continue much longer than in those just now described; the pulse becomes, and continues for several days together, very frequent and jerking; the skin retains its heat and dryness, though it is often pale at the same time; the child is usually excessively irritable and distressed; the breathing is rapid and oppressed, and often very irregular and uneven; the dulness on percussion extends; the bronchial respiration becomes more distinct and is heard over larger surfaces, and is accompanied with less of the subcrepitant and crepitant râles; the cough is paroxysmal, painful, and often very harassing; the appetite is lost, and the sleep uneasy and often broken. These symptoms continue for several days, or a week or two, when they assume the same characters they exhibit in more rapidly fatal examples; that is to say, asphyctic phenomena develop themselves, and the child dies exhausted and comatose, or perhaps convulsed, or after presenting for some hours, or a day, more or less severe spasmodic affections of different muscles or of the extremities.

The *lobar pneumonia of children over two years*, and especially of those over five years of age, exhibits most of the symptoms that characterize the same disease in adults. The chief differences to be noticed at these two periods of life, are the greater predominance of bronchitis in children, particularly in those under five or six years of age, which gives to the physical signs some peculiar features not observed in adults; the frequent absence of expectoration, and, when it is present, certain differences between it and that of adults; certain peculiarities in the character and seat of the side-pain; and the existence in many instances of more marked and more dangerous nervous symptoms.

The mode of onset is very different in different subjects. Generally, the attack begins with violent fever, increased frequency of breathing, more or less pain in the side, and short, dry cough. In such cases there is no difficulty in perceiving that the disease consists of some form of thoracic inflammation. But, in other instances, instead of this open and frank development, the disease comes on with symptoms which might well mislead any but a very attentive and competent physician, as to the true nature of the case. The most common cause of obscurity is a predominance of the nervous symptoms, which often gives to the case very much the aspect of a meningeal inflammation. In one example that occurred to myself, a boy between six and seven years old was seized, after a short exposure during a ride on a raw and cold day, with violent fever, pain in both ears, severe frontal headache, and great sensibility to light when exposed to it. He was, at the same time, very drowsy, sleeping nearly the whole day, but he could be roused when loudly and vehemently spoken to so as to answer a few questions and manifest great irritability, and, what was extremely suspicious of disease of the brain, when taken with the other symptoms, he vomited frequently. On the second day, the headache was very severe, the sensibility to light continued excessive, and he still vomited frequently, rejecting even water. The bowels were freely moved. There was up to this time no full cough, but only an occasional, and slight hacking, that scarcely drew attention. The respiration was accelerated, but there was no dyspnœa. No pneumonia could be detected, though carefully sought after. On the third day, the breathing was still more frequent, but not at all laborious; the vomiting continued, but the other nervous phenomena had lost some of their intensity, and auscultation revealed well-marked bronchial respiration before and behind, over the summit of the right lung, while over the same regions the percussion was dull. I have met with several cases in which the onset of pneumonia was attended with nervous symptoms that made the diagnosis difficult and obscure.

In other cases the onset of the disease is marked by symptoms of gastro-intestinal irritation, or by such a degree of fever and disturbance of the nervous system, with absence of evident local phenomena, as to render the nature of the attack obscure and uncertain. In one, for instance, occurring in a boy between four and five years old, and six weeks after recovery from measles, the attack began suddenly with violent fever, great restlessness and distress, vomiting, and distension of the abdomen. The case appeared to be one of gastro-intestinal disorder, as there was nothing to call attention to the thorax. On the second day, the symptoms were much worse, the skin being hot and dry, and the pulse one hundred and sixty in the minute, and jerking. The child was drowsy and heavy; it was difficult to make him answer questions, and his answers were confused and unintelligible; his movements were tremulous and uncertain. The tongue was dryish and very thickly coated, and he complained confusedly of pain in the abdomen, which was much distended, and sonorous on percussion. There was no sign of respiratory disease, except some quickening of the breathing, and a very slight cough, scarcely to be noticed. At this moment, however, when scarlet fever was apprehended from the great frequency of the respiration, the drowsiness, and the tremulous character of the muscular movements, auscultation and percussion revealed the true nature of the sickness in the shape of a lobar pneumonia of the lower lobe of the left lung.

In a majority of the cases, however, instead of the obscure and deceptive onset I have just described, pneumonia begins with fever, acceleration of the respiration, pain in the side, and short, dry cough. In some instances, the disease supervenes upon catarrh or bronchitis. The child ceases to play, refuses to be amused, and is either irritable and cross, or lies listlessly upon the bed, or, if still quite young, insists upon being kept upon the lap. In some few cases, in very young children, convulsions occur. The appetite is lost, or else very much diminished; the thirst is acute, and the disease once established, more urgent than in almost any other disease. Vomiting is quite common, especially in young children, but diarrhœa is rare, the bowels being generally more torpid than usual. From the first day often, and almost always by the second, we can perceive either crepitant or subcrepitant rhonchus, and sometimes bronchial respiration, confined usually to one side, and more frequent below than above, though, be it remarked, not at all rare, over the latter part.

As the case proceeds, the fever increases, the bronchial respiration becomes more distinct and is heard over a larger extent of surface, whilst the râles diminish in abundance. The skin is now very hot and dry, so as to impart a burning sensation to the hand; the pulse augments in frequency, seldom counting less than 140 in the minute, often mounting to 160, and in severe cases, and in young children, even to 170, and becoming full and hard; the respiration becomes more and more accelerated, until it rises to 40 or 50, and in a great many cases to 60, 70, or even 80, while it often becomes at the same time oppressed, and, when full inspirations are made, painful; the cough is frequent, dry, or almost dry, and painful at first, but after a few days begins to be moist, and in children over six or seven years of age is not unfrequently attended with an expectoration of rusty or sanguinolent sputa; the thirst continues intense, the appetite is null, and the child is very restless and irritable, or drowsy and inattentive. About the fourth or fifth day, as a general rule, the disease has attained its height, the febrile and local symptoms being then most marked, and the extent of the inflammation greatest, as shown by the physical signs.

At this stage of the disease the bronchial respiration is generally strongly marked, being clear and distinct, audible both in inspiration and expiration, and accompanied by bronchophony or increased resonance of the cry. The dulness on percussion is also very evident, the change from the natural sound being easily perceptible on a comparison of the two sides.

The symptoms generally remain stationary at this point for one or two days, and then begin to subside. The heat of skin diminishes and perspiration often appears; the pulse falls in frequency and force; the respiration becomes slower, easier, and full inspirations can be taken without pain; the alæ nasi no longer dilate; the cough becomes quite loose, and ceases to be painful; the thirst is less acute; the child loses some of its irritability and restlessness, and if it have been soporose and dull, becomes more wakeful and observant; the flushing of the face disappears, while the expression is more natural. On auscultation, the bronchial respiration is found to have lost some of its intensity; it has become more distant, or it is heard only in the expiration, and is mingled with, or in part replaced by crepitant or abundant subcrepitant rhonchus. The dulness on percussion is less marked. A little later, the fever ceases entirely; the respiration reassumes its natural rate; the appetite returns; the thirst disappears; the cough subsides very much, and the child begins to be interested in its toys or occupations. About the tenth or fifteenth day, and in some cases rather earlier, convalescence is fairly established, though auscultation may still reveal some prolongation of the expiratory sound and diffuse resonance of the voice.

In unfavorable cases, death seldom occurs early in the disease, but usually at some distance of time from the invasion, and in consequence, no doubt, of the transition of the inflammation into the third or suppurative stage. In such cases the disease has usually pursued the course just described up to the period of resolution, but, instead of resolution and convalescence taking place, the fever continues, though perhaps with diminished violence, the skin being less intensely hot, and the pulse less full and active, while it remains quite as frequent. The breathing is sometimes less frequent than before, but it is often more laborious, and very generally it becomes irregular and is easily hurried under exertion. The cough varies very much, being sometimes almost suppressed, and in other cases very troublesome; it is almost always loose. The strength diminishes, the voice becoming weak and feeble, and the muscular movements tremulous and languid; the face looks pale, haggard, and sunken; the child is sometimes very restless, tossing about from time to time on the bed or lap, with a quick, short, and evidently feeble movement, or it is dull and soporose, awakening only when spoken to, but showing then by its fretfulness and peevishness, that its intelligence is retained. While these symptoms are present, the extent over which the bronchial respiration is heard has generally augmented, showing the gradual extension of the hepatization, while outside of the part where the respiration is blowing, and sometimes over the same part, and intermingled with that sound, are heard more or less copious subcrepitant and mucous râles. This condition seldom lasts more than two or three days, at the end of which time the child dies in a state of coma, or after one or more convulsive seizures, which are the result of a gradually increasing asphyxia.

In other cases again, the termination is more gradual. The child, after presenting many of the above symptoms, may seem to improve somewhat. The fever may diminish, the appetite return to some extent, the respiration become easier, the restlessness subside, and the child become more cheerful again; but the face continues pale, emaciation makes progress, the appetite fails again, the pulse remains frequent, diarrhœa comes on, the cough becomes more troublesome, thrush often attacks the mouth, the strength decays continually, and, after some weeks perhaps of struggling, the child dies in a state of great emaciation and debility.

The symptoms of *partial* pneumonia are much more obscure and uncertain than those of the lobar form of the disease. Owing to the fact that the inflamed patches of the lung are disseminated or scattered through healthy portions of the organ, the signs afforded by physical examination are either very imperfect, or entirely masked by the sounds produced in the healthy texture. We are forced, therefore, to depend much more in this than in the lobar form, on the rational symptoms, in determining the nature of the sickness. The rational symptoms of partial pneumonia are nearly the same as those of the lobar form. The chief differences between the two are in regard to the pain, the dyspnœa, and when there is expectoration, in the amount of the sputa. The febrile and nervous symptoms, and the disturbances of the digestive system, are the same in the two forms, the only difference being in their degree of severity. In the lobar variety they are usually more acute and severe than in the partial. The local symptoms present important differences which should be noted. In the form under consideration, the pain is either wanting entirely or is much less acute than in the lobar form. When the inflamed patches are few in number, and they are seated in the central parts of the lung, there is entire absence of pain; but when they are more numerous and superficial, pain is complained of, but it is usually diffuse, of slight intensity, changeable, and felt only during cough or during full inspirations. It makes its appearance commonly on the first day, and very seldom after the third. Cough is rarely wanting. It usually marks the onset of the sickness, is extremely variable as to its frequency and severity, and is not acutely painful, as in the lobar form, unless the inflamed patches be superficial. There is seldom any considerable amount of expectoration, and in some cases none; when there is any it is small in quantity, and it may or may not be characteristic. In one case, however, that came under my observation, in which I had every reason to believe, from the nature of the rational symptoms, and from the absence of physical signs, that the disease was partial pneumonia, there was a rare expectoration of thick, viscous mucus, streaked with blood. The respiration is accelerated, and, when the lesion is at all extensive, there is dyspnœa, the degree of these symptoms being determined by the extent and number of the inflamed patches.

The physical signs are not, as above stated, very significant. The percussion is natural, the amount of tissue consolidated being insufficient to affect the sonorousness of the chest. Auscultation affords no signs of the pneumonic inflammation when the number of affected patches is small; when they are more numerous it is of some, but not of very great utility. Crepitant râle is sometimes heard here and there over circumscribed points of the thorax, and, disseminated in the same way, there is also heard in some instances rude respiration, prolonged expiratory murmur, and bronchial respiration. When, as often happens, this form of the disease coexists with bronchitis, it will be entirely concealed by the dry and moist râles of the latter affection.

The *duration* of pneumonia has been fixed with considerable accuracy by the observations of various persons. As a general rule, the disease reaches its highest point of severity in about four or five days, then remains stationary for one or two days, and diminishes regularly until between the tenth and fifteenth day, when convalescence is established. In my own practice, the longest duration in nineteen unmixed cases, in which the period was accurately noted, was fourteen days, and the shortest five. The duration of the nineteen cases was as follows: in one case, fourteen days; in one, eleven; in three, ten; in five, nine; in three, eight; in two, seven; in two six; and in two, five days. One case lasted thirty-three days, but it was accompanied and followed by bronchitis.

PARTICULAR SYMPTOMS; PHYSICAL SIGNS.—In order to practise auscultation and percussion in a young child, it should be placed by the mother in a sitting posture on her knee, while the physician, kneeling on the floor, or sitting on a low chair, makes the examination he deems necessary. If the child be old enough to take notice, it should be attracted and amused by some toy or glittering object. Even, however, should it cry violently, much valuable information is to be obtained by the examination, for we can ascertain the presence or absence of rhonchi and their characters during the deep inspirations between the cries, and can observe resonance of the cry and cough, and practise percussion.

The physical signs of *lobar pneumonia* are crepitant or subcrepitant rhonchus, feeble respiration, bronchial respiration, bronchophony, resonance of the cry and cough, and dulness on percussion. They are, in fact, the same in the great majority of cases as in adults. Under five years of age, this form often begins with subcrepitant rhonchus, while after that period, the earliest stethoscopic signs are crepitant rhonchus, or feeble respiration. The bronchial respiration makes its appearance soon after the subcrepitant or crepitant rhonchus, is heard first in the expiration, and then in both inspiration and expiration, and is accompanied by bronchophony, resonance of the cry and cough, and dulness on percussion. Bronchial respiration was present in thirty of the thirty-seven cases of lobar pneumonia observed by myself; crepitant râle was present in seventeen, and subcrepitant in nine.

These alterations of the auscultatory phenomena are confined to one side, in the great majority of cases, and are best observed over the posterior inferior portion of the lung. MM. Rilliet and Barthez state that they have never known the bronchial respiration to disappear, in favorable cases, before the fifth day, and in the majority not before the seventh, eighth, or ninth; while in fatal cases, it continued to the moment of death. Its persistence is always a highly unfavorable symptom in very young children, whilst in those who are older, as in adults, it sometimes remains for several days or weeks, though the general symptoms have entirely disappeared.

RATIONAL SYMPTOMS.—*Cough* may be said to be invariably present. It is dry at first, and not very frequent, but in one or two days becomes more frequent, often very troublesome, and from dry and harsh, becomes more or less humid and loose. It continues until the disease moderates, lasting generally from nine to sixteen days. In fatal cases it usually persists to the last. In infants it is not very frequent, occurs in short paroxysms, and in fatal cases often ceases one or two days before death. MM. Rilliet and Barthez remark that in pneumonia of the upper lobes, it has a peculiar character. It is little, short, smothered as it were, or piercing, teasing, or slightly hoarse. I will merely add that cough is sometimes scarcely noticeable in cases which simulate hydrocephalus, during the early part of the attack. In one case that occurred to myself, already referred to, in which the symptoms bore for several days very much the aspect of a meningeal attack, there was no full cough whatever during the first two days; on the third day, though auscultation and percussion showed the existence of pneumonia of the upper lobe of the right lung, the child coughed only three or four times, and it was not until the sixth day that it became at all frequent. In three other cases the cough was so slight in the early stages of the disease, during the continuance of the cerebral symptoms, as not to have been noticed unless particularly inquired after. Later in the attack, after three, four, or five days, and as the cerebral symptoms moderated, the cough became frequent and loose, and the pneumonic symptoms pursued their regular course.

Expectoration is almost invariably absent under five years of age. MM. Rilliet and Barthez, and Dr. Gerhard, have never observed rust-colored sputa under the age mentioned. In older children there is sometimes, though not very often, voluntary expectoration. Even in them, however, the sputa seldom present the characteristic rust-color and viscidity observed in adults, but consist simply of mucus tinged with blood, or of whitish, brownish, viscous, or non-viscous phlegm. I once, however, saw a child three and a half years old, voluntarily expectorate viscid mucus, tinged copiously with blood. Sanguinolent expectoration was noticed in five of the thirty-seven cases seen by myself (not including the one just spoken of). In three the sputa were of the characteristic rusty color, in one they were composed of mucus streaked with blood, and in another, portions of mucus streaked with blood were rejected by coughing, and some also by vomiting. The age of the five subjects just alluded to, was in all between five and nine years. In another case (not included amongst the five), in a girl seven years old, affected with lobar pneumonia supervening upon pertussis, there was a free expectoration of tenacious mucus, sometimes streaked or dotted with blood, sometimes brownish, and sometimes rust-colored.

M. Valleix mentions a whitish or sanguinolent viscous froth, as sometimes escaping from the mouth of new-born children laboring under the disease. I have never met with this symptom, but know of one case of a child within the month, who, during an attack of pneumonia, vomited mucus tinged with blood. The child died, and presented the lesions of pneumonia. The nipples of the mother were perfectly healthy, so that the blood could not have been sucked by the child from them, but must have consisted of the sputa which had been swallowed after being coughed into the fauces.

It is scarcely necessary to say that the absence of expectoration is only seeming, for children undoubtedly cough the sputa into the fauces, whence, instead of being rejected as by the adult, they pass into the stomach.

Thoracic pain.—It is impossible to ascertain the presence of this symptom with positive certainty prior to the age at which children talk, and very often not for some time after, as they refuse or do not know how to describe their sensations. And yet, even in infants, the presence or absence of the stitch in breathing, and of pain in coughing, may be inferred almost with certainty by watching the gestures and expression of the child, and the cries, which accompany a full inspiration and the act of coughing. In effect, deep inspirations induced by moving the child, those which take place during vomiting and gaping, and those also which occur in the act of coughing, cause the child to cry out suddenly and sharply, and give at the same moment an expression of acute suffering to the countenance, which can be referred to nothing else than the causes just mentioned, and which reveal almost as plainly as words the painfulness of a deep inhalation and of the act of coughing. In older children, I have several times known the pain to be most intense, causing bitter and repeated complaints, with crying, fretting, and evident acute suffering. The seat of pain, as complained of by children who talk, ought also to be noticed, since the account given by them might well mislead an unwary and inexperienced physician. It is quite common, in fact, for them to refer the pain to the false ribs, to one of the flanks, to the abdomen, and even to the hip.

The *respiration* is always quickened, except where the constitution of the patient has been greatly deteriorated by long and severe illness or other causes, under which circumstances it may remain at the normal rate, or be very slightly accelerated. This symptom usually dates from the invasion, soon after which the breathing rises as high as 40, 50, and 60 in the minute in older children, and from 60 to 80 in the younger. It sometimes becomes excessively rapid, reaching, as it did in a case of pleuro-pneumonia in an infant six weeks old under my charge, 128. In favorable cases, the acceleration subsides usually about the seventh, eighth, or ninth day. In most of the cases the breathing is even and regular, while in others it is short, abdominal, uneven, and jerking. When the dyspnœa is very great in a young child, the nostrils dilate widely, the mouth remains open, and its angles are drawn downwards and outwards; the last of these symptoms is almost a fatal one. Sometimes the rhythm of the function is changed, so that it begins with a sudden, active, and moaning expiration, followed by the inspiration, after which comes the interval of rest. MM. Rilliet and Barthez state that unequal, jerking respiration, occurs almost exclusively in cases of inflammation of the upper lobes.

Physiognomy.—The face is almost invariably flushed. The color, at first scarlet, becomes after a day or two deeper and darker, and in severe cases assumes a livid red tint. I have noticed in very severe pneumonia, in addition to the deep red tint, a peculiar glazed appearance of the skin, which looks as though it had been varnished, while the edges of the flush are distinct and abrupt. The lips are generally deeply colored, simultaneously with the face. The flush commonly subsides about the same time, or a little before the diminution in the rate of the respiration. In fatal cases, the face is apt to lose its color, and become pale and sallow, as the unfavorable symptoms become more and more marked. The pallor of the face is most striking in severe and fatal cases occurring in infants; the face is blanched, and the features pinched.

The expression of the face is one of anxiety and oppression in the early stage; in very severe cases, or those about to terminate unfavorably, the features become drawn and contracted.

Fever exists in all the idiopathic cases. The pulse, at all ages, is rarely under 130 from the first to the sixth or seventh day; in the youngest children it rises as high as 140, 160, and even 180; while in those who are older, it is seldom above 140. In favorable cases, it diminishes about the fifth, sixth, or seventh day. In fatal cases, it is apt to diminish at the same period, but soon becomes more frequent and continues so to the end.

The *skin* is hot in the beginning, and continues so until the disease subsides. The heat is intense in severe, but not so great in milder cases.

The *nervous system* shows more or less marked symptoms of disorder. There is restlessness, peevishness, and irritability during the day, and these increase towards evening. As the night advances, the child becomes still more restless; infants will not sleep except in the arms, and wake crying or fretting every few minutes or hours; older children sleep uneasily, talk in their sleep, or start and cry out, and are often delirious. In some instances, the irritability is most distressing, both to the child and to those around. The child is constantly fretting and whining; it wants its playthings, but will not touch them; food, but rejects it; and slaps and scolds at everything about it. Convulsions sometimes occur at the invasion. They last an uncertain length of time, and are usually followed by insensibility, from which the child wakes with fever, accelerated respiration and cough, indicating the true seat of disease to be the lungs, and not the brain, as might at first be supposed. I have met with but two cases attended with convulsions. One occurred in a boy between ten and eleven years of age, on the second day of the disease. The attack was induced more, however, by an unwholesome meal taken on the first day of his sickness, than by the mere effect of the local inflammation. In the other case, which occurred in a boy between five and six years old, there were two convulsive seizures, a violent one on the first day of the pneumonia, and a slighter one a few days later. The headache is sometimes very severe; in a few instances I have known it to be so violent as to constitute the most prominent symptom of the case. On one occasion, indeed, it was so intense, and so much complained of, during the first two days of the fever, as to withdraw my attention from the true seat of disease, and it was not until the third day that I discovered the existence of pneumonia. The cough was in this, as in other instances, in which the nervous symptoms were strongly marked, so slight as to escape notice.

Digestive Organs.—Complete anorexia is generally present from the first; the thirst is intense, greater, indeed, than in almost any other affection of childhood. The tongue is moist, as a general rule, and covered with a whitish or yellowish fur. Vomiting and diarrhœa occur at the invasion of about half the cases in hospitals: in private practice, vomiting often occurs, but diarrhœa much less frequently.

DIAGNOSIS.—The *lobar* pneumonia of children is most liable to be confounded with bronchitis, pleurisy, and hydrocephalus. There is little probability, however, that lobar pneumonia would be mistaken for bronchitis by any but a careless or incompetent observer; for the presence, in the former, of subcrepitant, and very often of crepitant rhonchus, of bronchial respiration, bronchophony, resonance of the cry and cough, and dull or flat percussion, confined to one side, would easily distinguish it from bronchitis, which is marked by dry and moist râles over both sides of the chest, and by a normal condition of the percussion. It is difficult and often impossible, as already stated, to detect the existence of *partial* pneumonia, at least to make the diagnosis with absolute certainty. The cause of the difficulty, as before explained, lies in the fact that it presents, in a great many instances, no clear physical signs. When the number of inflamed nodules scattered through the healthy texture of the lung is small, and especially when they are deeply seated, no alteration whatever of the natural respiratory sounds can be perceived, and we are obliged to depend entirely upon the rational symptoms,—the accelerated breathing, oppression, pain, cough, fever, and the absence of the physical signs of other pulmonary inflammation. Sometimes the presence of the characteristic sputa of pneumonia will, in older children, make the diagnosis clear. When the inflamed nodules are situated near the surface of the lung, we may, in some instances, detect crepitant or fine subcrepitant râle and bronchial respiration, over circumscribed portions of the lung, and there would be, under such circumstances, no hesitation as to the diagnosis.

It has been stated that pneumonia might be confounded with pleurisy. This could not happen in regard to the partial form, as the slighter degree of the pain, the limited extent of the râle and bronchial respiration, and the absence of dulness on percussion in the latter, would prevent such a mistake. The distinction between pleurisy and the lobar form is more difficult, but may generally be made out by attention to the fact that pleurisy is rare under six years of age; by the greater severity of the pain, the absence of rhonchi, the effect of change of position on the sounds yielded by percussion, the shorter duration and greater mildness of the general symptoms, the entire absence or small amount of expectoration, and by the continued dryness of the cough in pleurisy; and, lastly, by the disposition on the part of pleurisy to become chronic, while pneumonia nearly always remains acute.

Pneumonia in children not unfrequently simulates, in its early stage, an attack of meningitis, constituting a form of the disease, sometimes called cerebral pneumonia. Vomiting, constipation, extreme irritability or restlessness, and complaints of headache, occur in both, while the absence of thoracic symptoms to draw attention to the true seat of the disease in pneumonia, may readily mislead. The cough in the early stage of pneumonia is sometimes very slight, and not being observed by the attendants, is not reported to the physician. The frequency of the respiration is overlooked, or, if noticed, is ascribed to the fever, which is supposed to depend on the cerebral inflammation. In pneumonia, however, the vomiting is not usually very frequent, nor very obstinate, nor are the bowels so much constipated as in hydrocephalus. These variations from the ordinary symptoms of hydrocephalus, minute though they be, ought to attract the notice of the physician, and lead him to examine the case more carefully; when, in all probability, the physical signs would immediately reveal the pneumonia. I may mention, in illustration, that I attended a boy six years old, who, for three days, suffered from violent fever and excruciating headache, which last was the only symptom complained of. There was neither cough, expectoration, nor any marked acceleration of the respiration. After three days the headache moderated, and he had slight pain in his side; on examination, I found him laboring under well-marked lobar pneumonia. In April, 1847, I was called to see a boy nineteen months old, who had been taken sick with slight fever, a little hoarse cough, and mild pharyngitis. After remaining in this condition for five days, he began to be drowsy and very irritable, the surface became pale, and the extremities rather cooler than natural. From the sixth to the tenth day, there was great somnolence, the child sleeping nearly all the time; when waked from sleep, he was always exceedingly irritable and cross, scarcely opening his eyes, and then shutting them again immediately to avoid the light, which was evidently painful. During this time he took scarcely any food, but little drink, and vomited several times freely; the bowels were moved without medicine; the surface remained very pale, and the extremities often cool; the pulse was frequent and small, the respiration perfectly regular, for which reason it attracted no attention, and there was *no cough* whatever. Under these circumstances, I hesitated between regarding the case as one of meningitis, or of hydrocephaloid disease, as described by Dr. M. Hall. I took the latter view, however, and treated it with small quantities of brandy, cold to the head, and the frequent employment of mustard pediluvia. From the eleventh day the child began to improve; it would open its eyes from time to time, and look round for a few moments; the face began to show a slight degree of color, and the palms of the hands, which had been white and transparent, exhibited a tinge of the natural pink hue which they have in children. Observing about this time that the respiration was accelerated, though perfectly free and regular, and without cough, I counted it, and was astonished to find it 80 in the minute. I now examined the chest carefully, and finding slight dulness on percussion with bronchial respiration, over the inferior half of the left side behind, immediately understood the nature of the case: it was one of latent pneumonia, simulating hydrocephalus. The child was now treated for pneumonia, and after an illness of twenty-seven days longer, recovered perfectly. As the case progressed, the rational signs of pneumonia were more and more apparent, the cough becoming frequent and painful, and after a time loose, while the cerebral symptoms gradually disappeared.

In addition to these cases, I have met with several others which during the early stage resembled very closely the invasion of cerebral disease. One of these has already been referred to in the account of the symptoms of the disease. Two others occurred in children within the year, and one in a child between one and two years old. Attention, however, to the rate of the respiration and the physical signs, and the presence of slight cough, revealed, in two of them, after a little hesitation, the true character of the attacks. The third case, which occurred in one of the children within the year, was unattended by any cough during the first few days, and was, therefore, very obscure, until my attention was attracted by an acceleration of the respiration, when the physical signs, and at a later period, cough, explained the real nature of the attack. I may remark, in addition, that in all these cases, the absence of constipation, the infrequency and short duration of the vomiting, and some clearness of the intelligence when the child was fairly roused, though but for a few moments, from its state of somnolence, were other motives for doubting the attacks to be meningitis.

Dr. West states that pneumonia is often overlooked in teething children, in whom the cough is called a tooth-cough, whilst the diarrhœa, which frequently occurs, and becomes the prominent symptom, is supposed to depend upon dentition, and is alone attended to. The diarrhœa is obstinate, and when, at last, the cough attracts attention, it is ascribed to phthisis, and the physician is astonished to find at the autopsy purulent infiltration of the lungs, but no tubercles, and no disease of the intestines. The diagnosis is to be correctly made, under such circumstances, only by careful physical examination.

Prognosis.—It may be stated, in general terms, that pneumonia is the more dangerous in proportion as the child in whom it occurs is younger; and that the secondary, consecutive, or intercurrent form of the disease is much more dangerous than the primary. It is usually supposed to be almost necessarily fatal in new-born children, and to be very dangerous, though less so than in neonati, up to the sixth year of age. There has been so much confusion, however, in regard to atelectasis of the lung and true pneumonia until within a very few years past, that it is scarcely possible to trust to former statistics upon this point. From six years of age up to fifteen, the disease is generally curable when of the primary form; when of the secondary form the result is much more doubtful, and will depend in great measure, of course, on the nature of the disorder during or after which it occurs.

MM. Rilliet and Barthez (*Loc. cit.* p. 585) state that they lost about one-eighth of their cases in private practice. Of these, the youngest was a year old, the oldest, three years old. To quote their own words: "Some evidently died of accidents caused by the medication (poisoning by tartar emetic); one was the victim of a relapse, due to faulty hygienic care; and others died of cerebral pneumonia of the upper lobe; they were undergoing the process of dentition." In the hospital, they lost a seventh of their patients. The subjects under five years of age died of cerebral, gangrenous, or intestinal complications. Those over five years of age died, some because they were scrofulous or feeble, the inflammation, though lobar, being double; and the others, in consequence of the inflammation having become complicated with pleurisy, scarlet fever, or meningitis. They add, that in the hospital, six-sevenths of the patients attacked with secondary pneumonia died.

The results of my own experience, which, it ought to be remarked, has been acquired almost exclusively in private practice amongst the easy classes of society, have been as follows:—Of fifty cases of well-marked lobar pneumonia, only two were fatal. Of these two, one occurred in an infant six weeks old, and was accompanied with extensive and violent pleurisy, and the other occurred in a child between two and three years old, lasted thirty-three days, and was attended with considerable bronchitic inflammation.

We may conclude, therefore, that pneumonia under two years of age is always dangerous, and much more so when secondary than when primary; that primary pneumonia, between the ages of two and five years, will terminate favorably in the great majority of cases in private practice; and that when the disease attacks children between six and fifteen years of age, the termination is nearly always in health.

The following are some of the most unfavorable symptoms of the disease: convulsions; small, weak pulse; extreme rapidity of the respiration; persistence of the bronchial respiration in young children; incomplete resolution of the disease within the ordinary period; excessive and obstinate diarrhœa; severe cerebral symptoms; great emaciation; greatly altered physiognomy; excessive irritability; and a yellowish tint of the skin. M.

Trousseau regards as an unfavorable symptom the occurrence of swelling of the veins of the hands, which he supposes to depend on an obstacle to the function of hæmatosis.

TREATMENT.—The treatment of pneumonia has been studied with the greatest care during the last several years. The researches of Louis, Grisolle, Rilliet and Barthez, and West, have given a completeness and certainty to this part of our subject, not possessed in regard to any other malady. I shall confine my remarks to the remedies which are now generally acknowledged to be most important, leaving those of doubtful value unnoticed.

Bloodletting.—It is very generally conceded at the present time, that the loss of blood, whether by venesection, leeching, or cupping, exerts a more powerful influence upon pneumonia than any other remedy. Its effects are to relieve, and in some cases, to remove, with very great rapidity, the general symptoms. It reduces the frequency and force of the circulation, moderates the heat of the skin, calms the restlessness, and relieves the dyspnœa, thoracic pain, and headache. It is very doubtful, however, whether it shortens the duration of the disease, or exerts much influence on the extent of the hepatization,—at least such is the conclusion of several of the French observers. Dr. West awards to it the first place in importance amongst the remedies for the disease, and, if it be restricted to a certain class of cases, I may say that I concur with him in opinion. These cases, however, have been but a minority of the whole in my own practice, though this has been exclusively private, and almost entirely confined to the easy and even wealthy families of the community. That it is not necessary in all, or nearly all, is shown by the fact that I made use of it only in sixteen out of thirty-nine primary cases in which the treatment was carefully noted, and in only two out of seven secondary cases, or in eighteen out of forty-six cases in all. Of these forty-six cases, two were fatal, in neither of which was it employed. One of these occurred in a child six weeks old, and was accompanied with very severe pleuritic inflammation; the other occurred in a child between two and three years old, and I have always regretted that I did not make use of depletion, in some form, early in the case. It appears, therefore, that all of the eighteen cases in which bloodletting was employed recovered, while of the twenty-eight cases in which it was not employed, two died. Of the two deaths, however, one occurred, as stated above, at six weeks of age, from severe pleuro-pneumonia, in which no other result could have been anticipated. This leaves twenty-six cases of recovery without depletion, enough to show, at least, that it is not essential in all cases.

My opinion is, therefore, that depletion ought not to be employed indiscriminately in all children attacked with pneumonia, but that it should be restricted to a certain class of cases,—to those, in fact, occurring in hearty, vigorous subjects, of naturally good constitution, and of good present health.

In weakly and debilitated children, it ought never to be used, or only with the greatest circumspection and moderation, and then as a general rule, only in the form of cupping. It ought to be employed with much hesitation in those born of feeble parents, in whom it may be supposed that there is but little stamina to go upon, and lastly, it may be said that when the physician doubts at all as to whether he should employ it or not, it is best to abstain.

I know that the opinion has been advanced, and vigorously maintained, by several more recent writers of extensive observation and experience, that pneumonia recovers as well, or almost as well, without as with bloodletting. I freely acknowledge, moreover, that of late years, I have used this means more rarely and more sparingly than formerly; but I cannot doubt the evidence of my senses; and I have too often witnessed a great and immediate mitigation of the symptoms, both general and local, of the disease, from a bleeding, leeching, or cupping, to be willing to abandon the use of these means, and trust the case entirely to its natural course.

I have already referred to the fact that whilst the general symptoms are mitigated by bloodletting, the local disease is apt to run its usual course of several days. I once saw a boy, five years of age, with lobar pneumonia of the left side, from whom eight ounces of blood had been taken by venesection and leeches, walking about the room apparently well, after a week's sickness, but in whom there was still present over the inflamed lung, dulness on percussion, bronchial respiration, and crepitant rhonchus; and I have had under my charge a girl four years of age, who, on the seventh day of the attack, after being leeched on the fifth, had a respiration of twenty, a pulse of ninety, and a cool natural skin, who was, in fact, entirely convalescent; in whom, nevertheless, there was dulness on percussion over the lower half of the right lung, with bronchophony and bronchial respiration.

The amount and manner of the depletion must depend on the age of the patient, and the form of the pneumonia. It is usually recommended to make use of leeches and cups in children under two years of age, and of venesection after that age. The quantity of blood to be drawn, must depend on the age and strength of the patient, and the violence of the attack. At the age of two or three years, and in idiopathic cases, about four ounces may be taken from the arm at once. Should this fail to produce some relief to the symptoms in twelve hours, the bleeding may be repeated, though this is very rarely advisable, in my opinion; or better still, some scarified cups or leeches may be applied over the seat of the disease. I feel quite sure that I have seen more benefit derived from cups than leeches under these circumstances, and would therefore prefer to use them where there is nothing to prevent. It is a common idea that scarified cups are too painful to be applied to young children, but this is not the case when they are properly selected. The cups should be much smaller than those used for adults, and the scarificator of a size to suit the cups. With these precautions, it will be found that the operation of cupping a child within the year, and still more from the age of a year upwards, is less annoying to the patient, and more expeditious than that of leeching. I would, on these accounts, strongly advise country practitioners, who often complain of the difficulty or impossibility of procuring leeches, to provide themselves with cups of a size suitable for children, to be used in the place of leeches.

Whether leeches or cups be preferred after general bleeding, about two or three ounces of blood should be taken from over the inflamed portion of the lung.

In children under two years of age, leeching, as has been stated, is generally preferred to venesection. I have, on a few occasions, however, employed venesection in the course of the second year, when the symptoms have been very acute. The number of leeches (American) should seldom exceed ten or twelve, which will commonly take about two ounces of blood.

In cases of secondary pneumonia, depletion must be used with great care, as this form of the disease has been found not to bear the loss of blood well. It is best, therefore, in most of these cases, to employ only local bleeding.

To conclude my remarks upon the subject of bloodletting, I will merely state, in order that the reader may form his own judgment upon its results in the cases above referred to, that venesection alone was employed in nine of the thirty-nine primary cases, and in one of the seven secondary cases, and that it was resorted to but once in each case; that both venesection and leeching were employed in one of the primary cases; that leeches alone were made use of in three of the primary, and in one of the secondary cases, and, lastly, that wet cups were employed alone in three of the primary, and in nine of the secondary cases.

Antimony.—Tartar emetic is well known to exert a powerful influence over pneumonia. Most writers agree in stating that it, like bloodletting, diminishes the force and frequency of the circulation, and relieves the oppression, but that, like bloodletting in this respect also, while moderating the constitutional symptoms and tending to keep them within safe limits, it fails to cut short or jugulate the inflammation. While writers agree, however, in regard to the effects of antimony in pneumonic inflammation, they differ very much as to the doses they recommend and the modes in which they administer it. I shall mention first the manner in which tartar emetic is employed by two of the best European authorities in diseases of children, and then state my own opinions in regard to its proper mode of use.

Dr. West (*Loc. cit.* 2d Ed. p. 217) prescribes it "in doses of one-eighth of a grain every ten minutes till vomiting is produced in the case of a child of two years old, and continued every hour or two hours afterwards for a period of twenty-four or thirty-six hours." He thinks that depletion either general or local ought almost always to precede its use in pure idiopathic pneumonia, while in cases preceded by bronchitic symptoms, depletion is not so important. The existence in any case of extensive or well-marked bronchial respiration, should be regarded, he thinks, as of itself contraindicating the antimonial plan of treatment. It appears that Dr. West has been led, by a more extended experience, to lessen very materially the doses he makes use of, and this I am very glad to find, as it serves to confirm me in the opinion I have had for several years past, that the doses employed by the European physicians are much too large. In fact, Dr. West has reduced his doses, since the publication of his essay on pneumonia in 1843 (*Brit. and For. Med. Rev.*, April, 1843), very nearly one-half, and recommends the continuance of the remedy during one-half the length of time that he formerly thought necessary. His latter doses I have already cited. His former plan was to give it "in doses of a quarter of a grain to a child of two years old, repeated every ten minutes till full vomiting is produced, and continued afterwards every two or three hours, for forty-eight or sixty hours."

MM. Rilliet and Barthez give to younger children, from two to four grains, and to those who are older, as much as six grains of the tartar emetic, in about four ounces of fluid, in the twenty-four hours. They administer the solution in spoonful doses every two hours. If the first dose causes vomiting the subsequent ones are repeated at longer intervals. The quantity given on the first day is continued for the two, three, or four following days. They recommend caution, however, in the administration of the remedy, especially in very young children; and, should it produce excessive vomiting or severe diarrhœa, advise its instant suspension. Should the state of the inflammation still require its administration, they employ it in very minute doses, and abandon it immediately should the intestinal symptoms return.

For my own part, I have long thought that the doses recommended by the writers quoted above, and by many others, are much too large, that they are unnecessary, and that they cannot fail, in many instances, to prove positively dangerous. Though many children bear them successfully, as shown by the experience of the authors cited, there are many others, at least if human nature be the same in Europe as in this city, who could not fail to be dangerously impressed by such doses. In my own practice, doses which seem as nothing almost, compared with the above, have answered all necessary purposes; while larger ones, and, in some subjects, even the very small ones, have produced symptoms of an alarming kind. These symptoms have consisted in a more or less persistent paleness of the skin, exhaustion, with rapidity and weakness of the pulse, attended sometimes with drowsiness alternating with irritability, depending apparently on prostration, and resembling the condition of *shock*, as described by Dr. Marshall Hall. That antimony often produces injurious effects on the economy is the opinion also of MM. Rilliet and Barthez, though they are amongst those who advocate large doses. They in fact state (*Loc. cit.* 1ère edit. t. i, p. 467, 468), that "one of the chief causes of gastritis and softening of the stomach in children has been, according to our experience, the employment of energetic treatment directed upon the gastro-intestinal mucous membrane. We refer particularly to the tartar emetic solution given for several days in succession. Though the doses were not carried to a great extent, and the quantity of the vehicle was ample, the disease has often occurred, thus proving the susceptibility of the mucous coat." They recommend great reserve in its use, "because two-thirds of the cases of gastritis that we have observed, and some of the cases of softening, followed the employment of that remedy." They remark afterwards, however, that the gastro-intestinal lesions generally followed the exhibition of the antimonial in secondary, while it seldom occurred in idiopathic cases of the disease. In their second edition (t. i, p. 535), in a foot-note, these writers state that they have lost about one-eighth of their patients in private practice, and amongst the causes of death cite the following: "Some died evidently from accidents caused by the medication (poisoning by tartar emetic)." The parenthesis is their own.

I find it difficult to understand how children can safely take this remedy in the doses recommended by MM. Rilliet and Barthez, and by Dr. West, since in my own practice doses of a twentieth or thirtieth of a grain given every hour to children of two years old, are quite as much as they will bear without incessant nausea, and, in a great many, without the signs of severe prostration. Indeed, in some children of four and five years old, I have found that the thirtieth, fortieth, and even fiftieth of a grain, repeated every hour, caused more sickness, paleness, distress, and prostration, than I liked to see, and how such patients could have borne doses of an eighth, a quarter, or half a grain at a time, I am at a loss to understand. Moreover, I believe, as was stated above, that large doses are unnecessary, since I have been able to cure the disease with much smaller ones, and it is certainly best to avoid giving more of such a remedy as antimony than is absolutely requisite.

My own practice has been to give the remedy after depletion, in doses of the thirtieth, fortieth, and even sixtieth parts of a grain every hour, to children of the age of two or three years, and even in this quantity it often produces vomiting or painful nausea. If the fever, oppression, and heat of skin, persist in the same degree after several doses, the quantity should be increased; if, on the contrary, they subside, the doses ought to be diminished. In the cases of children over the age of three years, the dose must be increased according to circumstances. A very convenient and satisfactory mode of exhibiting antimony to children, is to give the vinum antimonii, combined with sweet spirits of nitre, in the doses of two, three, or four drops of the former, with ten or fifteen of the latter, repeated every two hours; the proportions of the former to be increased or diminished as the stomach is found to tolerate it. To infants within the year, antimony ought to be given, it seems to me, with the very greatest caution. Many at that age do not tolerate well more than from half a drop to two drops of the wine, every two hours. Beyond that dose, it is very apt to produce exhausting nausea or diarrhœa. The use of the antimony ought to be persevered in until the acute symptoms have moderated, when it should be left off gradually.

Calomel.—I am induced to believe, from personal experience, that calomel is much less frequently required in the treatment of pneumonia, than was at one time very generally, and than is now, by a good many writers, supposed necessary. I have found a fair proportion (forty-eight out of fifty) of the cases that have come under my hands, recover with but an occasional and very moderate resort to it, and as I deem it a violent remedy that ought to be administered only when really called for, I have prescribed it much less frequently and in much smaller quantities than has been recommended by most authorities, and especially by the English.

I have made use of it occasionally, however, under two conditions of things,—at the onset, when the febrile symptoms ran very high in strong, robust, and ruddy children, and during the course of the disease, when even small doses of antimony were not well borne, and when yet the severity of the reactional state demanded a strong and permanent sedative. In the former case, I have given one full dose of two or three grains, to procure the sedative and cathartic action of the drug, while in the latter I have employed it in small doses, in combination generally with nitrate of potassa, and, unless there has been some contraindicating symptom, as drowsiness, or very sick stomach, with Dover's powder. My usual prescription for a child four or five years old is the following:

℞—Hydrarg. Chlor. Mitis, ... gr. iii.
Pulv. Doveri, ... gr. iii vel vi.
Potass. Nitrat., ... gr. xxiv.—M.
Ft. in Chart. No. xii.

One of these is to be given every two hours. Should they occasion too much drowsiness after several have been taken, or produce distressing nausea, the dose is halved or suspended. I have seldom given more than six or eight, or at most the whole twelve of these powders.

In some cases of pneumonia in hearty children, in whom, after bleeding and the use of tartar emetic for two or three days, the febrile symptoms continued severe, in which the pulse was full and jerking, the skin very dry and hot, the countenance brightly flushed and looking as though glazed or varnished, the thirst acute, and in which there was a great deal of restlessness and distress, from the acuteness of the fever, I have found much advantage from the following combination:

℞—Hydrarg. Chlor. Mit., ... gr. iii.
Antimon. Sulphuret. Præcip., . . gr. ss. vel i.
Pulv. Doveri, ... gr. vi.—M.
Ft. in Chart. No. xii.

Of these, one is to be given every two hours until quiet is produced, when they should be suspended entirely, or given only once in four hours. Should they occasion vomiting, only half a powder must be given at a dose. MM. Rilliet and Barthez oppose the employment of calomel in secondary pneumonia as injurious, and in idiopathic cases as unnecessary, because in the latter form, the treatment by depletion and antimony has succeeded very well in their hands. Dr. West, on the contrary, awards high praise to it as a remedy after depletion, and gives it usually combined with tartar emetic. Dr. West also recommends it very strongly in cases of neglected pneumonia, after the time for depletion has gone by. In such cases its internal employment is often contraindicated by the existence of diarrhœa; under these conditions he uses it externally. In children of four years of age, he directs one drachm (of mercurial ointment I suppose), to be rubbed into the thighs or axillæ every four hours. He says he has never known salivation to follow this plan, but has found the symptoms to diminish gradually in severity, and the solid lung to become once more permeable to air. Of the success of this plan of treatment I have had no personal experience, as such cases are very rare in private practice. I would, however, under these circumstances, prefer the employment of the iodide of potassium, which I have found of great service in the chronic pulmonary complaints of children. From one to two grains of that remedy, dissolved in compound syrup of sarsaparilla, may be given three times a day, to a child three or four years old.

Expectorants; Purgatives.—Ipecacuanha is preferable to the antimonial preparations in the treatment of pneumonia under the following circumstances: when the disease occurs in infants within the year; in children of highly nervous temperament, or of feeble and delicate constitutions; in many cases of the secondary form; in some of those in which bronchitis forms a prominent element of the attack; in mild cases; and lastly, in subjects who from idiosyncrasy do not bear antimony well,—and there are many such. The most convenient preparation is the syrup, of which from ten to twenty drops may be given every two hours, at four years of age; from five to ten drops, between one and three years; and from one to three drops to infants of two or three months. It is useful to combine sweet spirits of nitre with the syrup, in doses to suit the age. In cases of pneumonia attended with bronchitis, when the child is much oppressed by the presence of large quantities of mucus in the bronchia, the operation of an emetic is often highly beneficial. Ipecacuanha is the most suitable remedy under these circumstances, as it answers the indication perfectly well, and produces less exhaustion and depression than any other. Either after or without the emetic, I have found decided benefit in such cases from the administration of decoction of seneka and spiritus Mindereri. For a child two years old I direct two drachms each of seneka and liquorice root to be boiled in a pint of water down to twelve ounces, and strained. A teaspoonful of this decoction is to be given every two hours, with twenty drops of the spiritus Mindereri.

A *purgative* dose is useful at the beginning of the attack as a derivative and evacuant, but after that period, cathartic remedies need to be used only to such an extent as to keep the bowels soluble. It is scarcely necessary to say that when antimony is employed, especially in any considerable quantity, it almost always supersedes the necessity of purgative medication. The patient ought, however, to have a stool once a day or every second day. At first, a dose of castor oil, a moderate quantity of magnesia or syrup of rhubarb, is all-sufficient. In the after-treatment of the attack, a repetition of the same remedies in smaller quantity, or, what is often better, an occasional enema, is all that is necessary. Violent or frequently repeated doses of purgatives are injurious by exhausting the patient, or by setting up gastric or intestinal irritation.

External Applications.—MM. Rilliet and Barthez say that they have never found either blisters, or Burgundy pitch or tartar emetic plasters, exert the least influence upon any one of the symptoms of pneumonia, but that, on the contrary, they increase the fever. Dr. West has been led to abandon the use of blisters entirely, in consequence of the irritation and fever they occasion, and the disposition to sloughing he has observed amongst the poor. I think I have observed great benefit in a few instances from the application of a blister, when depletion and antimony or ipecacuanha have failed to produce some moderation of the symptoms after four or five days. I have always been careful, however, even in children two or three years old, never to allow the blister to remain longer than an hour and a half or two hours. I direct it to be removed commonly in an hour and a half, whether the integument be blistered, of a scarlet color, or unchanged. A warm bread and milk poultice is then used as a dressing, and rarely fails to cause vesication in a few hours, if it have not already occurred. Many times I have been told by the mother that the skin was still white and unchanged beneath the blister when she removed it, and yet the poultice has produced full vesication. Treated in this way, blisters cause very little irritation, and I have never known but one to slough in my life, and that happened in a child whose skin had been very much irritated by frictions with amber oil and ammonia.

Since the spring of 1845, however, when I was led to make frequent use of mustard poultices and foot-baths in the treatment of the bronchitis and pneumonia of measles, I have rarely employed blisters, but have preferred the employment several times a day of the remedies just indicated. Two parts of Indian meal and one of mustard, for young children, and for those who are older equal parts of each, are to be mixed with warm water, and spread thickly like a poultice on a piece of flannel or rag five or six inches square. This is to be covered with fine muslin, linen, or gauze, and applied first over the back and then the front of the thorax. It may remain from fifteen to forty minutes, or until the child cries or complains, or until the skin is reddened. The mustard foot-baths may be employed at the same time with the poultices. These applications are useful whenever the oppression is very great, and, when resorted to in the evening, they often allay irritability and dispose the child to sleep. The number of applications to be made in a day must depend on the urgency of the symptoms. I have employed them from once a day to every two or three hours.

Tonics and stimulants are to be resorted to in cases which manifest undoubted signs of debility. When, therefore, the attack occurs in a feeble child; when the inflammation remains unresolved after depletion and other remedies, and when extensive bronchial respiration persists, though the fever has moderated, attention must be paid to the state of the constitution, to the neglect of the local disease. The system must be sustained and strengthened, in order to give it time and power to carry on the operations necessary for the removal of the local obstruction. With this view, all depleting means should be abandoned, and the child put upon a nutritious diet and the use of tonics and stimulants. The diet may consist of preparations of milk, of soups, eggs, and small quantities of meat carefully prepared. The best stimulants are weak brandy and water, milk punch, wine-whey, or wine-whey and arrow-root water. The most suitable tonics are quinine and the preparations of iron. A grain of quinine, suspended in a mixture of equal parts of syrup of gum and syrup of ginger, and given three or four times a day, has succeeded best in my hands.

Opiates are often necessary in cases occurring in children of highly nervous and irritable temperament, in the secondary and cachectic forms of the disease, and whenever the cough is very frequent and harassing. After the acute symptoms have moderated a little, an evening dose of the Dover's powder, or a few drops of laudanum or paregoric, with sweet spirits of nitre, are often of great service. Even during the acute stage, small quantities of opium, in combination with the antimony, ipecacuanha, or calomel, are very useful in allaying irritability or suffering.

General Management.—The diet ought to be very strict in idiopathic cases. The child should have nothing for two or three days except demulcent drinks, or weak milk and water sweetened; no solid food ought to be permitted. After the severity of the symptoms has moderated, pure milk, milk toast, or chicken water may be allowed; and when all fever has disappeared, the usual food may be given, at first, however, in small quantity. A child at the breast ought not to nurse as freely as usual. At all ages, care should be taken to give water from time to time: very young children often suffer severely for want of attention to this point. I have seen the most violent and obstinate screaming in a child a year old, quieted at once by a copious draught of cold water. The patient should be kept strictly confined to a well-ventilated room, with the temperature as nearly as possible between 68° and 70° F. A direction given by some of the French writers, and by Dr. Gerhard, is not to allow very young children to lie for too long a time in one position in bed, or in the nurse's arms, as it is apt to produce a stasis of blood in the dependent portions of the lungs, and thus to maintain or increase the disease. Dr. West recommends, whenever the inflammation has reached an advanced stage, or involved a considerable extent of the lungs, that the patient be moved with great care and gentleness, lest, as he has often seen occur, convulsions be produced.

ARTICLE III.

BRONCHITIS.

DEFINITION; SYNONYMES; FREQUENCY; FORMS.—The term bronchitis is now universally employed to express inflammation of the mucous membrane of the bronchia.

It is usually called in this country catarrh, and catarrhal fever. It has been stated, under the head of Pneumonia, that many of the cases known amongst us by the popular term catarrh-fever, are, in fact, cases of pneumonia. I shall on account of this misapplication of names, endeavor to draw the distinction between bronchitis and pneumonia with great care. Bronchitis is not treated of either by Dewees or Underwood. Dr. Eberle confounds it with pneumonia, under the titles of catarrh, catarrhal fever, acute bronchitis, and pleuritis.

Bronchitis is one of the most frequent of the diseases of childhood. We have already seen that pneumonia causes a larger proportion of deaths amongst children in London, than any other disease except the exanthemata. Bronchitis causes a larger number of deaths in this city than any other diseases of the respiratory organs, with the exception of pneumonia and croup. This is shown by the fact that during the five years from 1844 to 1848, inclusive, there occurred in this city 18,599 deaths under fifteen years of age, from all causes. Of these, 613 were from bronchitis, 756 from croup, and 772 from pneumonia. It is said to be more common as a secondary than as an idiopathic disease. Of 115 cases observed by MM. Rilliet and Barthez, only 21 were idiopathic. Of 123 cases, however, that I have recorded, 76 were primary, and the remaining 47 secondary. The diseases during the course of which it is most apt to occur, are pertussis and measles.

I shall describe three forms of the disease: 1, *acute bronchitis* of moderate severity; 2, *acute suffocative bronchitis*, or catarrhus suffocativus, the congestive catarrhal fever described by Eberle and by Dr. Joseph Parrish, of this city; 3, *subacute* or *chronic bronchitis*.

CAUSES.—Amongst the *predisposing* causes of the disease, *age* is one of the most important. MM. Rilliet and Barthez suppose it to be much more common in children over, than in those under five years of age. Of one hundred and fifteen cases observed by them, thirty-seven occurred between the ages of one and five years, and seventy-eight between six and fifteen years of age. It is scarcely fair, however, to compare a period of nine years with one of only four, as is done in the above statements. Of one hundred and twenty cases that I have seen in private practice, in which the age was noted, fifty-four occurred between birth and two years of age; thirty-nine between two and four years; twelve between four and six; six between six and ten; and three between ten and fifteen. Of eighty-one cases under four years of age, of which I have kept an accurate record, eleven occurred in the first half of the first year of life, twenty in the second half, making thirty-one for the first year; twenty-one occurred in the second year of life, nineteen in the third, and ten only in the fourth, showing that the liability is greatest in the first year of life, and particularly in the last half of that year, that it continues very strong in the second and third years, being nearly equal in each of these, and that it then suddenly diminishes. It would seem also that the simple acute, and the acute suffocative forms are most common under six years of age, while the secondary cases occur more frequently after that age.

As to the influence of *sex* on the liability to the disease, it would appear from my experience to be rather more common in girls than boys, since of ninety-nine cases in which this point was noted, fifty-four occurred in girls, and forty-five in boys. The fact of its being more frequently a *secondary* than a *primary* affection, has already been noticed, though this has not been true of my experience. The diseases in which the largest number of cases occur are measles, pertussis, and typhoid fever. The secondary cases are most common, of course, during the prevalence of the diseases whose progress they complicate, whilst the primary cases are most common in the cold months of the year, and especially in the autumn and spring. Bronchitis is sometimes *epidemic* amongst children as it is amongst adults.

The only *exciting causes* whose effects in the production of the disease seem clearly proved are sudden transitions from a warm into a cold atmosphere, and sometimes the contrary change; prolonged exposure to cold, particularly when combined with moisture; and the inspiration of irritating gases. I believe myself, from what I have seen in this city during the last eleven years, that the most fruitful cause of bronchitis, and also of pneumonia, croup, and angina in early life, is the style of dress almost universally used for young children. The dress is entirely insufficient. It consists usually of a small flannel shirt, cut very low in the neck, scarcely covering the shoulders, and without sleeves; of a flannel petticoat, a muslin petticoat, and an outer dress made in nearly every case of cotton. The dress, like the flannel shirt, is cut low in the neck, is without sleeves, and fits very loosely about the chest, so that not only are the whole neck, the shoulders, and the arms exposed to the air, but, in consequence of the looseness of the dress about the neck, it is fair to say that the upper half of the thorax is also without covering. In the infant, from birth to the age of six or eight months, the dress is made long, a wise provision so far as it goes, but from the time the skirts are shortened, up to the age of four or five years in boys, when happily the time for boys' clothes arrives, and, throughout childhood in girls, the trunk of the body and the arms are dressed, or rather, left undressed, as above described. But, not only are the neck, breast, and arms left bare, but in many children the greater part of the legs also are kept uncovered, or, at least, short stockings, scarcely rising above the ankles, and muslin or sometimes Canton flannel drawers, not reaching, or scarcely reaching to the knees, leave exposed to the air a large proportion of the cutaneous surface of the lower extremities. Now, in this dress, the child passes the day in a house, the sitting-rooms of which are heated usually to 68° or 70°, but in which the entries, and sometimes the parlors, are frequently at a temperature of 60°, 50°, or even lower, as I myself have tested with the thermometer. And not only are the entries and parlors, and indeed all the rooms, saving the one or two in constant use, frequently at the temperature just mentioned, but the air of the nursery itself is often allowed, through the negligence of the servants, and especially early in the morning, to fall to 60° or 58°, or possibly lower still.

That this style of clothing is not correct, is proved by the simple facts that children, who are dressed nearly the same in summer as in winter, suffer scarcely at all from colds in the summer season, when the thermometer seldom ranges below 76°, and is usually above that point; and also by the fact, that adults have been driven by long and almost forgotten experience, to wear clothing twice or three times as warm as that which they put upon their children. How constantly do we see the strong and fully-developed man comfortably enveloped in a warm long-sleeved flannel shirt, woollen or thick cotton drawers, and cloth pantaloons, vest, and coat, in the same room, and in the same temperature, with the little, often puny, pale, and half-naked child. But it is almost impossible to make people understand that children need as much clothing as themselves. They always insist upon it, that as the child passes the greater part of the day in the house, it cannot require as much clothing as the adult who is obliged to go out and face the weather, forgetting, or refusing to see, that the former wears less than half, or probably not more than a fourth as much covering as the latter, and that the adult, when in the house and in the same rooms as the child, finds his one-half or three-fourths warmer clothing not at all superabundant or oppressive.

I have repeatedly had patients to get well of chronic catarrhal and laryngeal coughs, and to cease to have, as before, frequent recurrences of these disorders, under the simple treatment of a long-sleeved and high-necked merino or flannel shirt, long woollen stockings, and stout Canton flannel drawers coming down below the knees, and that too, after the most patient and assiduous, and sometimes over-assiduous, trials of drugs, diet, and confinement to the house, had entirely failed of any permanent good effects. The fact is, that though there are some few children who can bear the dress above described without injury, there are a great many more who, while they wear it, either suffer all winter long from frequently-repeated attacks of cold, in the shape of croup, chronic laryngeal irritation with cough, chronic pharyngitis, bronchitis, acute or chronic, or more rarely pneumonia; or, if they escape these direct effects resulting from the constant and rapid waste of their caloric, they are rendered more pale, thin, and delicate-looking than they would be were their vital forces husbanded by warm clothing, instead of being wasted in the constant struggle to keep up the heat of the uncovered body at the natural point.

ANATOMICAL LESIONS.—I shall describe, first, the lesions met with in cases in which the disease is confined to the larger bronchia, the inflammation not extending into the capillary tubes, and next those observed in cases in which the disease has attacked the capillary bronchia; the former are those which constitute the form designated under the title of acute ordinary bronchitis of moderate severity, while the latter are those to which the term capillary has been applied. Patients seldom die of the first-named variety of the disease alone, but, as it often occurs as an accidental complication, or a more or less essential part of different severe and frequently fatal diseases, the morbid alterations which characterize it, have been very thoroughly studied and ascertained.

The morbid alterations of *acute ordinary bronchitis* always exist in both lungs, and are confined to the larger bronchia, ceasing on a line with the smaller tubes and the capillary divisions. The most constant alteration is redness of the bronchial mucous membrane, caused by injection of the minute vessels of that and the subjacent tissues, and varying in shade from a rosy to a bright red or brownish tint. The mucous membrane is sometimes softened, a change which can be ascertained only in the largest tubes, and it sometimes presents a thickened, unequal, and rough appearance. Ulcerations are very rare. The inflamed bronchia contain a more or less abundant viscid, transparent, or opaque yellowish mucus.

In *capillary bronchitis* the alterations of the mucous membrane of the capillary tubes, do not always reveal the existence of the disease. That membrane is sometimes pale in the minute ramifications, and exhibits morbid changes only in those of medium size. The alterations of the membrane consist in redness, which is made up either of a number of fine points, seated in the membrane itself, or of arborizations seated both in the membrane and the cellular tissue beneath; it sometimes presents a granulated appearance, and it may be more or less thickened, and its consistence diminished. The bronchia are usually filled and almost obliterated, from the secondary divisions to the final ramifications, by a substance of a yellowish-white or yellow color, non-aerated, and composed of a thick muco-pus. Portions of false membrane are sometimes, not as a rule, but exceptionally, found mixed with the secretions just described, while in other instances, false membranes alone are present in certain tubes. The false membrane may exist in the form of patches, or it may constitute a lining to the whole extent of the bronchial ramifications. It is usually soft and but slightly adherent, and the mucous membrane beneath is either very pale and of its usual consistence, or red, softened, and rough. The different kinds of secretion are commonly most abundant in the bronchia of the inferior lobes.

In a good many of the cases, another lesion, dilatation of the bronchia, is also found upon examination. This alteration evidently occurs under the influence of the inflammation; it may affect either the length of the air-tubes, or only their extremities. In the former condition, the tube continues of the same size, or becomes gradually larger from one of its early subdivisions, until it reaches the surface of the lung; in the latter condition, a section of the lung presents an areolar appearance, from the presence of a multitude of little rounded cavities, communicating with each other and with the bronchia, of which they seem to be a continuation. These cavities are generally central, though they are sometimes found upon the surface of the lung, in which case they are formed of the pleura, lined by the thinned membranes of the dilated bronchus.

The fact of these cavities being true dilatations of the bronchia, has been called in question by Dr. Gairdner (*Loc. cit.*, p. 76), who believes, on the contrary, "that almost all the so-called bronchial dilatations, and all of those presenting the abrupt sacculated character here alluded to, are in fact the result of *ulcerative excavations* of the lung communicating with the bronchia." He supposes them to be the result of the expansion of certain small cavities, frequently met with in the bronchitis of children, and to be described directly under the title of vacuoles or bronchial abscesses, either by ulceration or by the act of inspiration.

In addition to the lesions already described as existing in bronchitis, there is another one, not unfrequently met with, to which I shall call attention, that to which the French writers apply the term *vacuoles*, and which Dr. Gairdner designates as *bronchial abscess*. The latter author states that in the centre of the collapsed lobules of a lung affected with acute bronchitis, there are found, not unfrequently, small collections of pus, varying in size from that of a hemp-seed to double or treble that volume. "These small abscesses present, on section, an appearance so much like that of softening tubercles, as to be very readily mistaken by many persons for these bodies; and the resemblance is all the greater on account of the peculiar limited form of the condensation by which they are generally surrounded, which, when felt by the touch from the exterior of the lung, is exceedingly deceptive. In their interior, however, these little abscesses contain, in the recent state, a very fluid pus; moreover, they are often met with as acute lesions produced by a few days of illness, and without a trace of tubercle in any other organ." When the pus is scraped or pressed out of these abscesses, in their recent form, they are found to be lined with a fine villous membrane, while in other instances they are not abruptly limited, but the pus appears to lie in contact with the surrounding pulmonary tissue. The bronchia leading to the part of the lung thus affected, are found, when incised, to be much inflamed, their mucous membrane being vascular, thickened, and covered with pus; and some of them can be observed to communicate with the purulent collections, the mucous membrane having been, at the point of communication, destroyed by ulceration, and either stopping short abruptly, or becoming gradually incorporated with the false membrane lining the abscess. Sometimes these abscesses or vacuoles communicate not only with the bronchia, but also with each other, without difficulty; sometimes, according to Dr. Gairdner, they break into one another and form more considerable excavations, but, more commonly, they remain of limited size, preserving perfectly the direction and relations of the bronchial tubes. They occur both in the diffused and lobular form of condensation from collapse of the lung, and both forms may sometimes be seen in the same lung.

The alteration just now described has excited a good deal of discussion amongst medical writers, and has been very differently accounted for. MM. Rilliet and Barthez regard it as a simple terminal dilatation of the bronchia, while MM. Barrier, and Legendre and Bailly, consider it to depend on a purulent breaking down of the vesicles of one or more lobules. MM. Hardy and Behier look upon it as a lesion of a complex nature, partaking both of dilatation of the bronchia and of pulmonary emphysema. Dr. Gairdner, as already mentioned, describes them as abscesses, and states that they "unquestionably arise from the accumulation of pus primarily in the extreme bronchial tubes of the collapsed lobules." This view, which is closely similar to that of MM. Barrier, and Legendre and Bailly, is, it appears to me, much the most reasonable that has been adduced.

MM. Rilliet and Barthez, in their second edition, as has already been stated, in the article on post-natal collapse, describe at great length a state of *congestion* of the lung-tissue, as a most important element in the anatomical alterations of the bronchitic diseases. This congestion usually assumes one of two forms: it may be distinctly lobular, consisting then of disseminated patches, or, as more generally happens, large numbers of contiguous lobules are affected, when it takes the form of generalized lobular congestion. These congested portions of the lung are almost always attended with more or less well-marked collapse of the vesicles, so that there is associated together the conditions of congestion and collapse. It is this combination of bronchitis with congestion and collapse, which was formerly described by them, under the titles of lobular and generalized lobular pneumonia. The alteration to which the term carnification has been applied, and which not unfrequently coexists with bronchitis, they regard as different from the above, and as consisting in a simple collapse of the lung-tissue, without the active or passive congestion which exists in the first form. The principal causes of this condition are, according to them, debility and catarrh. The signs of catarrhal inflammation are, they state, never scarcely absent. In only four out of thirty-one cases did they fail to discover them.

The parenchyma of the lung presents, in bronchitis, different appearances in different cases. It is supple, crepitant, and of a rose-gray color, but does not collapse, especially the anterior portions, when the thorax is opened, as does healthy lung. This imperfect collapse depends either on the fact that the thick mucus and muco-pus which fill and obstruct the bronchia, prevent the contained air from being expelled by the natural elasticity of the lung, or, when no secretions exist to produce this effect, on the loss of the natural elasticity of the organ. Another cause is the existence of vesicular emphysema, a lesion observed to a greater or less extent in nearly all the cases, and affecting usually the summit of the lung, its anterior edge, and also its posterior or lateral edge. In a large number of cases, and particularly in those occurring in young children and in weakly and debilitated subjects of all ages, the tissue surrounding the diseased bronchia exhibits the condition which has already been fully described in the article on atelectasis, under the title of collapse of the lung. The extent and mode of distribution of this lesion, its peculiar and distinguishing characters, its causes and mode of production, and the method of treating it, have been carefully treated in the article just referred to, and I shall make no further allusion to it, in this place, except to beg the reader, who is not already fully acquainted with it in all its bearings, not to suppose himself master of the subject of bronchitis until he has also fully studied that of collapse, as the two go together so constantly, and the latter is practically so important, especially in children, as to make it essential for him to understand both.

The lesions just described as characteristic of acute bronchitis, are also met with in the *chronic* disease. The dilatation of the air-tubes, however, presents different features. The calibre of the enlarged tube is often much greater, its walls are whitish and uneven, and cry under the scalpel, and beneath the mucous lining may be seen hypertrophied transverse fibres. The mucous membrane itself remains smooth and polished, while the tissues beneath are thickened and hypertrophied.

SYMPTOMS; COURSE OF THE DISEASE; DURATION.—Acute simple bronchitis exhibits very different degrees of severity in different cases, being in some extremely mild and benign, and in others so much more severe, as to border closely on the capillary form of the disease. In its mildest form, it occasions merely slight cough and stuffing, a little mucous râle over the larger bronchia, with a total absence of dyspnœa, or of decided fever. In cases rather more severe than this, it begins with a moderately frequent cough, which, dry at first, soon becomes loose, and is neither paroxysmal nor painful. The expression of the face remains natural, with the exception of an appearance of slight languor. The pulse and respiration are but slightly accelerated; the external phenomena of the latter, an important means of diagnosis in infants, remain natural; it occurs without jerking, the rhythm continues even and regular, and there is no violent action of the alæ nasi. The percussion is not modified. Auscultation reveals in very young children a mixture of mucous and sibilant râles on both sides, which come and go, and are of short duration; in older children, the moist râles predominate, and commonly last several days. These sounds are seated in the larger bronchia. The temper of the child is not much changed; the appetite is not entirely lost; there is neither vomiting nor diarrhœa; and the fever is usually slight. The disease remains nearly stationary, or increases for a variable length of time, after which the cough becomes looser, and in children over five years of age, is sometimes attended with expectoration of frothy or yellowish mucous sputa, whilst under that age there is no expectoration. The fever and other symptoms, with the exception of the cough, now subside; the cough remains some days longer.

In attacks still more severe than this, the symptoms resemble very much those just now described, but they are all more intense. The cough is tighter, more frequent, harassing, and especially it is more painful, as shown by the fact that the child cries and complains, and that a marked expression of pain passes over the face at the instant of coughing. There is more fever, the skin being hot and dry, and the pulse more frequent, rising often to 130 or 140, and in one case to 156. The respiration is hurried, and though not attended with the same labor and anxiety as in the capillary variety, it is evidently oppressed; it counted in three cases, 60, 60, and 62. There is more restlessness, fretfulness, and general distress; the appetite is greatly diminished or lost, and infants nurse with less avidity than usual, or refuse to nurse at all for several hours together. In cases of this kind, the physical signs are more decided than in those of milder degree, there being a greater abundance of mucous and dry râles, and generally some subcrepitant râle, and they are heard over a larger extent of surface, usually over the lower half, two-thirds, or even the whole dorsum of the chest. The symptoms are almost always most marked and severe in the after part of the day and night. Very often the patient will be comparatively easy and comfortable in the morning, but as the day goes on, he becomes more feverish, restless, and fretful; the cough grows more troublesome, more frequent, and tighter; the breathing is quicker and more oppressed; the face is more flushed; the sleep is broken and disturbed, and the child may appear through the night quite ill; and yet as morning approaches, the symptoms moderate, the skin often softens and becomes moist, and the whole aspect of the case shows a great amelioration in the manifestations of the disease.

The *duration* of this form of bronchitis is very uncertain; the idiopathic cases last usually from four to seven or eight days, though they may last from sixteen to twenty-five; the duration of the secondary cases depends, in great measure, on the nature of the diseases during which they occur.

In any of these different degrees of acute simple bronchitis, the patient is liable, especially if it be a weak and debilitated child, or a young infant, to sudden and alarming aggravations of the symptoms. The breathing becomes suddenly either greatly increased in frequency, or excessively labored and oppressed, the surface becomes pale, the expression dull and languid, or distressed, the child is drowsy and inattentive, or uneasy and restless, the hands and feet are coolish, the act of sucking is performed with difficulty, or the child refuses the breast entirely, and it is evident that, from some sudden change in the condition of the lungs, the act of respiration and the aeration of the blood are very seriously interfered with. If this sudden aggravation of the symptoms be unattended with a corresponding increase of the febrile phenomena, as marked by greater heat of skin and augmented action of the circulation, it is altogether probable that it depends on a collapse of larger or smaller portions of the pulmonary texture, and if, on examination, we discover dulness on percussion, distant bronchial respiration, and cessation, or greatly diminished abundance of the bronchitic râles, over parts of the chest where a few hours or a day before there had existed all the physical signs of bronchitis, there can be no longer any doubt as to the cause of the suddenly increased severity of the symptoms,—it must be owing to collapse.

Acute suffocative bronchitis, capillary bronchitis, or the congestive catarrhal fever of Parrish and Eberle, and suffocative catarrh, or bronchial croup of other writers, may succeed to the form just described, or appear as an idiopathic affection. Under either condition the general symptoms are more threatening than in the preceding form, and the disease soon assumes all the appearances of great severity. The child is very uneasy and restless, constantly changing its position, moving about in the crib or bed, or insisting upon being changed from the bed to the lap, or from the lap to the bed. In one case that came under my charge the oppression was very great, and the only position in which the child was at all satisfied was resting on the mother's arms, with the front of its chest applied against the mother's breast, and the head hanging over her shoulder. The expression of the face is anxious and disturbed, and its color usually pale or slightly bluish. The temper is irritable or subdued; the child hates to be disturbed, and generally chooses its own position. The respiration is very much accelerated, running up in a very short time to 60, 70, or 80, and it is usually more or less irregular, and evidently laborious and difficult. The cough is very frequent, troublesome, and evidently painful; it occurs in short paroxysms usually, with or without stridulous sound, is at first dry, and after a few days, is accompanied, in older children, by whitish or yellowish expectoration. In some instances, the sputa consist of mucus tinged with blood, or of pure blood even, and still more rarely of mucus mingled with small shreds of false membrane. The appetite is entirely lost; the tongue is usually moist and furred white; there is acute thirst, and yet, in severe cases, though the presence of acute thirst is evident from the manner of the child, only very small quantities of water are taken, from the impossibility of suspending the respiration long enough to allow of more being swallowed; the drink is gulped rapidly, suddenly, and with great difficulty, and after a time is refused almost entirely from this cause. In children old enough to talk, the speech is short and abrupt; the patient dislikes to speak from the fact that the effort obliges it to suspend momentarily the act of breathing. Fever sets in from an early period; the skin is hot and dry, and the face is flushed at first, though it soon becomes pale in most cases, from the approach of an asphyctic state. The pulse becomes frequent, rising soon after the onset to 130, 140, 150, or higher; it is full and hard early in the attack. The resonance on percussion is not modified. Auscultation reveals at first sibilant râle, mixed with some mucous rhonchus, but soon a fine subcrepitant râle is heard over all the lower parts of both lungs behind, and approaching, sometimes, over the bases of the lungs, the character of crepitus. After a time the subcrepitant râle is heard over the whole, or nearly the whole dorsum of the chest, and to a greater or less extent, though not so well marked as behind, over the anterior regions of the thorax. This râle is audible at first both in inspiration and expiration, and is very distinct, but at a later period, it is heard only in the inspiration, or there is substituted for it a mucous râle, while the subcrepitant râle is now heard only in the forced inspirations during coughing or crying. These râles are fugitive and irregular, disappearing or changing from one to the other after fits of coughing.

Should the case not take a favorable turn, which change would be indicated by a moderation in the symptoms just detailed, and especially by easier and fuller respiration, with diminution of the amount of the subcrepitant râle, and return of the natural respiratory murmur over some parts of the chest, the symptoms look still more alarming. The oppression becomes excessive; fits of dyspnœa occur, in which the child is extremely restless and distressed, tossing itself about on the bed; the respiration runs up to 80, 90, or more, in the minute, and is attended with violent action of the alæ nasi; the pulse grows more and more frequent, rising to 150 or 180, and it loses force and volume; and the face assumes a whitish or slightly bluish tint, looks puffed, and is sometimes covered with perspiration. As the fatal termination approaches more nearly, the pulse becomes small, thready, and irregular; the respiration is uneven, irregular, stertorous, and often slower than before; the cough is smothered and less frequent; the restlessness generally diminishes, and the child sinks into quiet, and often becomes comatose; the paroxysms of suffocation are less frequently renewed, and less violent, and death occurs in a state of quiet insensibility, or is preceded by partial or general convulsive movements.

The *duration* of this form may be stated to be, on the average, between five and eight days. It may, however, end fatally in a much shorter time. In an example that I saw, in a child four months and a half old, death occurred in twenty-six hours from the onset. Dr. Eberle states that it seldom lasts longer than two or three days, and that in very young infants death sometimes occurs on the first day. M. Bouchut gives us the duration in children at the breast, from two days to a week. Dr. West mentions a case that proved fatal in less than forty-eight hours. In the favorable cases that I have seen the duration was seven, eight, and ten days.

Subacute and chronic bronchitis generally follows one of the acute forms of the disease. The character and severity of the symptoms vary very much in different cases. I have known some children to present for several months together, in the winter season, slight bronchitic symptoms, consisting in wheezing and somewhat accelerated breathing, cough, more or less frequent, occasional feverishness, especially at night, some diminution of appetite, loss of flesh, and sibilant and sonorous with mucous râles, heard here and there, but still without severe symptoms during the greater part of the time. Children laboring under this kind of bronchitic irritation are liable to, and generally have, from time to time, more or less sharp attacks of acute bronchitis, in which they present the usual symptoms of that form of the disease. These attacks are very apt to occur coincidently with changes in the weather, and in some patients the liability to them is so great, from the excessive susceptibility of the system to the weather, that no care will prevent them. In some instances, I am very sure that an aggravation of the symptoms of the chronic form constantly occurs whenever the child is about cutting additional teeth, whilst in the intervals between the appearance of the successive teeth, the child remains comparatively well. I believe that the cause of the aggravation at the moment of cutting the teeth, is to be looked for, not in the act of dentition itself, but in the circumstance that the liability to cold is greatly increased at that particular moment, probably because the forces of the system are so weakened by the effort of the dentition, as to lessen the power of resistance against the disturbing influence of a changing, and particularly of a falling temperature.

Cases of the mild kind of chronic bronchitis that I have just been describing, usually get well under proper medical, and especially under proper hygienic means, after several weeks or two or three months; while in other instances, the disorder continues, in spite of every precaution, throughout the winter and spring, and only ceases as the warm summer months arrive. I have known the same disposition to show itself again in the following winter. In other instances again, the frequent attacks of severe bronchitis, together with the effect of a constant slight bronchitic inflammation, ends in the production of an emphysematous state of parts of the lung, and the child exhibits more or less marked asthmatic symptoms, which show themselves whenever a slight increase of the bronchitis occurs, and whenever the digestive system is deranged by imprudences in diet or other causes.

In other examples of chronic bronchitis the symptoms are much more severe. These cases almost always follow an acute attack of the disease. The frequency of the respiration, and the attacks of dyspnœa persist; the cough is loose and paroxysmal, and the pulse frequent and small; evening exacerbations of fever take place, and the face and sometimes the rest of the surface, are often covered with perspiration. Auscultation reveals tubal blowing, with mucous or loud sonorous rhonchus, which seem to indicate the presence of dilatation of the bronchia. Emaciation makes rapid progress, the face is pale and blanched, the eyes sunken, the nostrils are covered with mucous or bloody crusts, and the lips ulcerated. Strength diminishes progressively; the appetite is lost, and the thirst acute; colliquative diarrhœa appears; and after twenty, forty, or more days, the child perishes in the last stage of marasmus. This form of bronchitis often simulates phthisis very closely, and may last for a long time, even several years. It rarely occurs under the age of five years. The expectoration consists of purulent or pseudo-membranous secretions in variable quantity.

PARTICULAR SYMPTOMS.—PHYSICAL SIGNS.—The *dry râles* are amongst the most frequent alterations of the respiratory sound in bronchitis. They may be sibilant or sonorous; they seldom exist alone, but are accompanied with mucous râle, and diminish as the latter becomes more abundant. As the dry râles cease to be heard, they are replaced by mucous or subcrepitant râle, or by feebleness of the respiratory murmur. The sibilant râle is often heard over the whole thorax, though it may be confined to the posterior portions. It is not restricted to cases of inflammation of the larger bronchia only, but is also present in capillary bronchitis.

Humid Râles.—Mucous and subcrepitant râle do not exist in all cases without exception, as they may be absent in such as are very mild. They may generally be heard over both sides behind, more rarely over the whole of the chest, and almost always both in inspiration and expiration. They are generally persistent, but are sometimes suspended for a moment and replaced by sibilant rhonchus or feeble respiratory sound. Their duration is in proportion to that of the disease.

Feeble respiratory murmur is sometimes observed. It is not permanent, occurs during the interruptions of the subcrepitant or sonorous râle, and does not occupy the whole extent of the thorax, but is limited; it is intermittent, and is not accompanied by diminished sonoreity.

When dilatation of the bronchia exists to a considerable extent, it gives rise to bronchial or even cavernous respiration, and to resonance of the voice, cry, and cough. The bronchial respiration differs from that of pneumonia by its tone, and by its intermitting. The *percussion* is generally sonorous.

It has already been stated in the account of the symptoms, that it happened not unfrequently in severe bronchitis, and also in mild bronchitis occurring in debilitated children, that the respiratory sound suddenly became feeble, or even entirely suppressed, over parts of the lung, while in other instances, a distant and imperfectly marked bronchial respiration takes the place of the natural vesicular murmur. These changes are heard either over small disseminated points of the lung, or over large surfaces; they are associated with more or less evident dulness on percussion, and what particularly characterizes them, they are very fugitive, being present at one examination, and absent perhaps at the next. The appearance of these changes in the phenomena afforded by auscultation, were formerly thought to indicate the occurrence of pneumonia, and especially of lobular pneumonia; they are now much more satisfactorily explained by the supposition that they depend on diffused or lobular collapse of the tissue of the lungs.

The physical symptoms above described are not invariably present in bronchitis. Cases do occur, though they are very rare, in which auscultation fails to reveal the presence of the disease.

Rational Symptoms.—The rational symptoms are of the utmost importance in informing us of the degree of severity of the attack.

Cough generally exists from the beginning, being in mild cases more or less frequent, and either dry or loose, while in severe cases it is frequent or very frequent, at first dry and then moist, and very rarely hoarse. In acute capillary bronchitis, the cough has a particular character. From the first day it occurs in short paroxysms, lasting from a quarter to half a minute. The paroxysms vary greatly in violence, occur at irregular intervals, and generally continue without interruption to the fatal termination, though they are sometimes replaced by simple loose cough a few days before that event. The cough is rarely painful, so long as the inflammation remains simple. Expectoration is never present in very young children. When it occurs in those over five years of age, it consists, in the mild form, of a sero-mucous or of a frothy and yellowish mucous liquid. In general bronchitis it is sero-mucous at first, becoming after a few days yellowish and more or less viscous; it is sometimes nummular, and sometimes amorphous.

The *respiration* varies in its characters according to the extent and violence of the disease. In mild cases, it is not much increased in frequency, being generally between 28 and 40 in the minute. In more violent cases, and particularly when the disease implicates the smaller bronchia, it becomes very frequent. The acceleration is slight in the beginning, but increases regularly as the case progresses; thus it may be 30 at first, and rise afterwards to 50, 60, 80, and even 90. When not very much quickened, it remains even and regular; when more so, it becomes somewhat laborious, and the movements of the chest are full and ample; in severe cases, attended with much dyspnœa, it is often irregular, or assumes the characters to which M. Bouchut has applied the term *expiratory*, that is, the order of the movements is inverted, each respiration beginning with the expiration, leaving the pause between the inspiration and expiration, instead of between the expiration and inspiration. In chronic bronchitis with copious purulent or pseudo-membranous expectoration, the dyspnœa is generally habitual.

Fever.—The fever is slight in mild cases, the pulse rising very little above its natural standard. The heat is not great, and the febrile movement usually subsides before the termination of the disease. In the grave or capillary form, on the contrary, the pulse is always frequent, and continues to increase in rapidity as the disease advances. It varies between 104, 120, 160, and in very violent cases, rises as high as 200. Early in the attack, it is vibrating, rather full and regular, whilst in fatal cases, it always becomes small, irregular, trembling, and unequal. The skin is generally hot in proportion to the activity of the pulse, except towards the termination, when the extremities often become cool. It is almost always dry. In very young children it is often pale and cold, and covered with perspiration from the beginning.

The *expression* of the face is unchanged in mild cases, but when the disease is violent and extensive, becomes deeply altered after a few days. The eyes are then surrounded by bluish rings, and the expression is uneasy, anxious, and sometimes, but less frequently, exhibits an appearance of profound exhaustion. The anxiety of the countenance increases with the oppression; the alæ nasi are dilated, the nostrils dry or incrusted, and the lips and face, which are extremely pale or momentarily congested, assume a purple tint, particularly after the paroxysms of cough.

The *decubitus* is indifferent at first, but as the disease progresses, the child lies with its thorax more or less elevated, or is restless and constantly changing its position.

In dangerous cases there is great *distress* and *restlessness* after the first few days, or even from the beginning. In some instances the irritability and peevishness are excessive and uncontrollable, while in others there is heaviness and somnolence, especially towards the termination of fatal cases. Some of the disorders of the nervous system just mentioned are present in all the grave cases.

Digestive Organs.—There is moderate *thirst* and incomplete *anorexia* when the disease is mild, but, when severe, the thirst is generally acute, and the appetite entirely lost. The state of the bowels varies. The *tongue* and *abdomen* present no special characters in idiopathic cases.

DIAGNOSIS.—The mild form of bronchitis, in which the inflammation is confined to the larger bronchia, is not likely to be mistaken for anything but the early stage of hooping-cough. The diagnosis can be made only by attention to the different characters of the cough, which is more spasmodic and paroxysmal in pertussis, by the absence of fever in that disease, and by the development of the peculiar symptoms of each, as the case progresses. The diagnosis between bronchitis and pneumonia is seldom difficult, except when the latter is grafted upon the former, or in cases of partial pneumonia, attended with bronchitis. In well-marked cases of the two diseases, there can be no difficulty. The restriction of the physical signs to one side alone of the chest in pneumonia, the peculiar crepitus of that disease, or when this is not heard, the fineness of the subcrepitant râle, limited to the upper or lower regions of one lung, the bronchial respiration and bronchophony, the dulness on percussion over the seat of disease, the greater sharpness and severity and the different location of the pain, the more acute character of the febrile reaction, as marked by the pulse, skin, and thirst, and the kind of expectoration, when there is any, will always enable us to distinguish the two with almost absolute certainty. In cases, however, in which the two are combined, the diagnosis is not so easy, but even here the presence of dulness on percussion, and of crepitant or fine subcrepitant râle, or, when these are absent, of pure metallic bronchial respiration with bronchophony, over limited portions of the lung, will generally render the matter clear.

The *sudden* supervention of dulness on percussion over large portions of one of the lobes of a lung, or over disseminated patches, with feeble or absent respiratory sound, or with muffled and distant bronchial respiration, generally indicates the occurrence of collapse in the part of the lung over which these signs exist; and when these symptoms show themselves without any increase in the severity of the febrile reaction, but rather with a diminution, there is every reason to suppose that they depend not upon inflammatory condensation of the parenchyma of the lung, but upon simple collapse from the presence of obstructive secretions in the bronchia.

Dr. Gairdner (*Loc. cit.*, p. 6) has called attention to a difference in the character of the dyspnœa in the two diseases, which is, I think, of considerable importance, and which I have often remarked myself. In bronchitis of any considerable severity, the respiration is always evidently laborious; it is performed only with the aid of all the accessory muscles of respiration, and in really severe cases it is laborious, the inspiration being long-drawn, exhausting, and inadequate. The dyspnœa of *pure* pneumonia is, on the other hand, quite different. It is merely an "acceleration of the respiration, without any of the heaving or straining inspiration observed in bronchitis, or in cases where the two diseases are combined." Dr. Gairdner states that he has repeatedly seen patients affected with a great extent of pneumonia of both lungs, in whom the extreme lividity and rapid respiration, numbering 50 or 60 in the minute, showed infallibly the amount to which the function of the lung was interfered with, who, nevertheless, lay quietly in bed, breathing without any of the violent effort, or disposition to assume the erect posture, so constantly accompanying the more dangerous forms of bronchitis. In children these differences are even more marked than in adults.

Chronic bronchitis may be mistaken for tuberculosis of the lungs or of the bronchial glands. The distinction can be made only by careful study of the history of the case, and of the phenomena afforded by auscultation and percussion.

PROGNOSIS.—Bronchitis is rarely a fatal disease, so long as it remains confined to the larger bronchia, constituting the acute simple form of moderate severity. Capillary bronchitis is, on the contrary, a very dangerous affection at all times, and at all ages. Even ordinary simple bronchitis, however, may prove fatal in young infants, and in debilitated children of all ages, from the supervention of collapse of portions of the pulmonary tissue; and it is necessary, therefore, that the prognosis given should always be guarded, when the disease occurs under either of these two conditions. The prognosis differs also in the primary and secondary forms of the disease, since, as might be expected, the danger is much greater in the latter than in the former variety.

I have met with 123 cases of bronchitis, of which I have kept more or less copious notes. Of these, 108 were mild, and 15 capillary. Of the 108 mild cases, 65 were primary, all of which recovered; and 43 secondary, of which 2 died. Of the 15 capillary cases, 11 were primary, of which 1 died, and 4 secondary, of which 2 died. Of the whole number, 123 in all, 5 proved fatal. The danger from the disease depends very much also upon the hygienic conditions in which the patients are placed. In hospitals, and amongst the poor, it is much more dangerous than in private practice amongst the easy classes of society. This is shown by the fact that all the cases of the capillary form observed by MM. Rilliet and Barthez, and Fauvel, in hospital practice, proved fatal, while of 15 cases seen by myself in private practice, under the most favorable hygienic conditions, only 3 died.

The symptoms indicating great danger are: increase of the dyspnœa, extreme anxiety, small and irregular pulse, coolness or coldness of the skin with clammy sweats, much jactitation, and delirium, drowsiness, or coma. With such symptoms, the danger is greater and the fatal termination more imminent in proportion as the child is younger, less robust, and its constitution exhausted by preceding or coincident disease.

TREATMENT.—The acute simple disease requires, when mild, little other treatment than careful attention to the hygienic condition of the patient, and the administration of some mild expectorant. The child ought to be confined to an apartment with a well-regulated temperature, and it should be kept quiet, either in bed or on the lap. The clothing ought to be warm, and yet not sufficient to produce free perspiration, as this would expose to chilliness. The diet must be simple, and may consist of some of the preparations of milk with bread. As an expectorant, an occasional dose of syrup of ipecacuanha through the day, either alone, or if the cough be frequent and troublesome, combined with a little paregoric, laudanum, or solution of morphia, is proper and useful. The bowels ought to be moved once in the twenty-four hours, either naturally or by enema. A warm foot-bath, with the addition of salt or mustard, in the evening, will generally assist to procure a quiet night.

When, in the same form, the symptoms assume greater severity, when the signs of reaction are prominent, the dyspnœa considerable, and the cough frequent and harassing, it is sometimes, though but seldom, I believe, advisable to take a little blood. In children under three years of age, it is best, as a general rule, to make use of leeches, by which from one to two ounces of blood may be taken from the interscapular space; in those over that age, from two to four ounces may be drawn in the same way, or by venesection. I am convinced, however, that a large majority of the cases of this form of bronchitis will do perfectly well without bloodletting of any kind. A gentle purge ought to be given, unless the bowels have already been freely moved. This may consist of castor oil, rhubarb, magnesia, or, what is a very convenient dose for children over two years of age, half a teaspoonful of fluid extract of senna, mixed with a teaspoonful of spiced syrup of rhubarb. At the same time, some febrifuge and diaphoretic may be exhibited with much advantage. I am in the habit of using the antimonial wine or syrup of ipecacuanha, combined with sweet spirits of nitre, as in cases of pneumonia. When the fever is considerable and the patient over a year old, the antimonial preparation is the best; from one to five drops, according to the age, with five drops of sweet nitre, may be given every two hours. In very young infants, half a drop only of the wine will be borne without nausea and exhaustion. If the ipecacuanha be preferred, and it is generally most proper for children at the breast, the dose must be proportioned to the age, constitution, and present condition of the patient.

If, as the case progresses, the bronchial secretions become very abundant and the dyspnœa severe, the proper remedy is an emetic. This may be ipecacuanha, either in powder or syrup, the syrupus scillæ compositus, or a teaspoonful of powdered alum, to be repeated, if necessary, in ten or fifteen minutes. The latter substance is, as I have stated under the head of Croup, a very certain, efficient, and safe emetic.

Great benefit may be obtained in all forms of bronchitis, from the more or less frequent application of mustard poultices to the front or back of the thorax, and from mustard foot-baths. If the symptoms prove obstinate, a small blister over the sternum, or still better, the interscapular space, allowed to remain not more than one and a half or two hours, and then dressed with a poultice, is often very useful, though it should be avoided in young children as long as possible.

The mercurial preparations, so much recommended by many of the English and by some of our own writers, are, in my opinion, very seldom necessary in this, or indeed, in any of the forms of bronchitis in children.

MM. Rilliet and Barthez recommend, when the cough and sibilant râle persist after the disappearance of the febrile symptoms, the use of small doses of the flowers of sulphur. I have myself known this remedy to prove of service in such cases. About four grains may be given every three hours to a child four years old.

The *grave acute* or *capillary* form of the disease must be treated more actively than the preceding. While the pulse remains full and strong, the face flushed, and the skin hot, depletion is proper and necessary. The amount of blood to be taken must depend on the age, constitution, and present condition of the child: if over two years old, if of strong and robust appearance, and not reduced by preceding disease, from two to four ounces may be drawn from the arm. In younger children it is better, in most, though not in all cases, to employ leeches, taking within two ounces at a time as a common rule. I am in the habit of applying leeches, in the cases of children, to the interscapular space, as the most convenient and most effectual place, because of its proximity to the roots of the lungs. After the child has recovered from the immediate effects of the bleeding, an emetic of ipecacuanha or alum may be administered with great benefit; two hours after the emetic, small doses of antimonial wine and nitre, or fractional doses of tartar emetic, should be prescribed, and repeated every hour or two hours. These doses should be, in my opinion, small. At two years of age, from one to two drops of antimonial wine, or a fortieth or even sixtieth of a grain of tartar emetic, given every hour or two hours, are quite sufficient. Should these doses cause repeated vomiting, or produce paleness of the skin, coolness of the extremities, or a languid, distressed, and anxious expression of the countenance, after being used for twelve or twenty-four hours, they ought either to be entirely dropped for a time, or else very much diminished,—and of the two courses to be taken, I believe that the former is the safest. In connection with these doses, counter-irritation to the surface of the chest will be found of very great service. Indeed, I doubt very much whether it is not the most important part of the treatment. It may be obtained by applications of dry cups to the back of the chest, or, if this be inconvenient or objected to for any cause, by the use of mustard poultices. The poultice ought to be about the size of the hand, or one half larger, and it should be made of one part mustard to two of Indian meal or flour. It is to be mixed with warm water, covered with book-muslin or cambric, and applied first to the dorsum of the chest; after having reddened at that point, it should be shifted to the front of the thorax. The time necessary for each contact is usually from ten to fifteen or twenty minutes. These applications ought to be renewed once in four hours, when the symptoms are only severe, but when these are urgent, they should be made every two hours. I am in the habit of depending very much, also, on mustard foot-baths. When the oppression is severe, and especially where there is any coolness of the extremities, the use of a foot-bath simultaneously with the mustard poultice, will often assist very much in relieving the breathing.

In very young infants, antimony ought not to be employed, in my opinion, and in these, therefore, we need some other remedy. In them ipecacuanha is much safer than antimony, and it is quite active enough. The best preparation is the syrup, of which from three to five drops may be given every two hours to infants six months old. In older children, also, in whom we have been obliged to suspend the antimony, and in those in whom its use has been contraindicated by delicacy of constitution or by feeble health, the ipecacuanha is preferable. The doses must vary with the age. At five years, about ten drops every two hours, in combination with the same quantity of sweet spirits of nitre, is a proper dose. When the child presents a pale surface and a languid expression, and particularly when the skin is very slightly warmer than usual, or coolish, the following prescription has proved a most useful one in my hands:

℞—Liq. Ammon. Acetat.,	℥ss.
Syrup. Ipecac.,	ʒi.
Liq. Morph. Sulphat.,	gtt. xl.
Syrup. Acaciæ,	℥i.
Aquæ,	℥iss.—M.

Ft. Mistura.

The dose of this is a teaspoonful for a child two years old, to be repeated every two hours. Should there be any nausea present, the syrup of ipecacuanha ought to be reduced to half the quantity; and if there be any drowsiness, the morphia must be left out.

In very severe cases of the disease, in which the dyspnœa is excessive, the pulse rapid and small, the skin cool and pale, the jactitation very great, and when there is present extensive mucous and subcrepitant râle, the treatment generally recommended is the frequent employment of emetics, and the French authors usually prefer tartar emetic. For my own part, I would not venture to administer, under such circumstances, so powerful a remedy, and especially so potent a sedative, as antimony, one that I have often known to cause alarming and dangerous prostration in children laboring under much slighter disorders than suffocative bronchitis. If any emetic be given, it ought to be one of milder action and less perturbing influence than tartar emetic, and I should choose, therefore, either ipecacuanha or alum. The plan of treatment I prefer, however, is to make assiduous use of counter-irritants, and to give internally the spirits of Mindererus and decoction of seneka. Depletion is, in these cases, either entirely contraindicated, or it should be resorted to only by the application of two or three small scarified cups. In a very severe case of this kind, the dangerous symptoms subsided under the use of cupping, mustard poultices and foot-baths frequently renewed, and the internal use of decoction of seneka and spiritus Mindereri every hour. Six small cups, of which only two were scarified, were applied once over the back of the thorax. In another case, which occurred in a child eighteen months old, during an attack of measles, the symptoms yielded and the eruption made its appearance, under the use of mustard foot-baths and poultices applied every two hours, and the internal use of spiritus Mindereri and sweet spirits of nitre. In both cases the symptoms of exhaustion were so strongly marked, that I feared to employ emetics, lest they might fatally increase the already dangerous prostration, though the dyspnœa and abundant mucous and subcrepitant râles seemed to call for them.

In the bronchitis of children, it often becomes proper and necessary to make use of *stimulants*. In the suffocative form, when the symptoms assume the character described in the last paragraph, small doses of brandy or wine-whey may be administered alternately with the spirits of Mindererus, with great advantage. In milder cases, also, when a sudden increase of the dyspnœa occurs, especially in feeble and debilitated subjects, and when we may suppose, from the character of the rational and physical signs, that collapse of portions of the lung has taken place, it is best to abandon for the time all nauseating remedies, and to make use simply of brandy in doses of from five to twenty drops every half hour or hour, or of wine-whey in dessert or tablespoonful doses, and of counter-irritants, with very light fluid nourishment. In such cases, the child ought to be laid on an inclined plane of pillows, and, with the exception of turning it gently towards one side or the other, from time to time, it should be kept perfectly quiet. These directions are particularly important in very young children, as it is in them that debility and exhaustion of the muscular forces are apt to bring about the state of collapse just referred to.

As an example of the kind of case in which stimulants are useful, and to show also the dangerous effects which antimony sometimes produces, I will quote the following: A girl between seven and eight years old, was attacked while in good health with severe bronchitis. On the second day, when I was called, she was very much oppressed, the skin was hot and dry, the pulse rapid, and the surface pale. I ordered a cupping to the amount of four ounces, with some dry cups besides, over the back, and two drops of antimonial wine with ten drops of sweet spirits of nitre were to be given every two hours. On the third day a blister was applied over the sternum. On the fourth day I found the child in the afternoon very pale, dozing or tossing about on the bed, and sometimes rising up on her hands and knees with a bewildered look; she was inattentive, so that it was almost impossible to catch her eye; the eyes were sunken, and the countenance was distressed and anxious; she moaned constantly and looked very ill; the skin was still hot; there was neither vomiting nor purging. The respiration was very much oppressed, and she coughed a good deal, though not so much as before. I suspended the antimony at once, and gave a teaspoonful of brandy in water, directing it to be repeated in three-quarters of an hour; after the second dose a teaspoonful was to be given in a wineglassful of milk and water every two hours throughout the night. On the following morning, the child looked better; she was less pale, and the eyes were not so excavated. The breathing was better. She was still very drowsy, but often waked partially with screaming and affright, and when awake took very little notice. The milk and brandy were continued every two hours. On the afternoon of this day, all the unpleasant symptoms had disappeared; there remained only those indicative of a slight bronchitis, and she was soon quite well. Now it seems to me exceedingly clear that, had the antimony been continued in this case, on account of the hot, dry skin, oppressed breathing, frequent cough, and from the absence of vomiting or purging, the child would have died.

The most important points in the treatment of *chronic cases* are to insist upon a rigorous and persevering regulation of the hygienic conditions of the patient, and to make use of tonic, balsamic, and expectorant remedies. The child should be carefully and warmly clothed. This, indeed, constitutes in most cases the truly important part of the treatment, for without it, there is but little chance that drugs of any or of all kinds, diet, or any other measures, will be of any real service. The dress ought to be the first thing attended to, and after it and as a secondary matter, certain medical substances will assist in removing the disease. The child ought to be taken as often as possible into the air in fine weather, and only in fine weather. The diet should be selected with a strict view to the improvement of the strength and vigor of the constitution; the food may consist, if the child be of proper age, of light meats, of potatoes and rice, as the only vegetables, and unless there is some contraindicating circumstance, of a small quantity of wine, with the mid-day meal. The best wine is port, of which one or two tablespoonfuls may be given in a considerable quantity of water.

Tonics must be administered throughout the course of the disease, or until the appetite and strength shall have improved to such an extent as to make them no longer necessary. The best are quinine, in the dose of a grain morning and evening, to be continued for several weeks, or, when the patient is anemical, the citrate of iron and quinine in the dose of half a grain or a grain three times a day, or from one to three drops of the solution of iodide of iron, used in the same way.

In one case of chronic bronchitis, which came under my care, the patient recovered under careful regulation of the hygiene, and the use of a decoction of seneka prepared by boiling a drachm each of seneka and liquorice roots, in a pint of water, to half a pint. The decoction was strained, and a large teaspoonful given three times a day. The remedy was continued during a period of two months; under its use the child grew fat and strong, and recovered entirely from the disease.

Other remedies, proposed by different authors, are the various resinous preparations; the balsams of tolu and copaiba; benzoin; and the sulphurous mineral waters. While these means are employed, it is recommended also to make use of counter-irritants. If any are used they ought to be such as will not produce too much inflammation of the skin, as for instance weak Burgundy pitch plasters, daily frictions with hartshorn and sweet oil, a simple diachylon plaster, or very mild pustulation with croton oil.

ARTICLE IV.

PLEURISY.

Definition; Frequency; Forms.—Pleurisy consists in inflammation of the pleural serous membrane.

Idiopathic pleurisy is a rare disease under five years of age, and especially in the first and second years of life. After the age of five years it becomes more frequent. I have met with 21 cases of pleurisy, of which I have kept notes. Of the 21, 19 were idiopathic, and 2 secondary, one of the latter occurring during hooping-cough, and the other being accompanied by pneumonia, though the pleurisy was the predominant disease. Secondary pleurisy, on the contrary, or that which occurs in the course of other diseases, is common at all ages. M. Bouchut met with it in 23 out of 68 autopsies of new-born and suckling children. Of the 23, 9 accompanied acute pneumonia, 6 tubercular pneumonia, 5 entero-colitis, and 3 different other diseases. This form of the affection is rarely detected during life, being masked by the concomitant malady.

I shall describe two forms of the disease, the *acute* and *chronic*.

Predisposing Causes.—As to the influence of *age*, it has already been stated that idiopathic pleurisy is very rare between birth and five years of age. It is certainly rare during those years in comparison with pneumonia, and especially with bronchitis, for I find that while I have met with but 10 cases of pleurisy of all kinds under 5 years of age, I have seen 19 of pneumonia under that age, and 105 of bronchitis under 6 years of age. Of 21 cases of pleurisy that I have seen, 19 were idiopathic, and of these one occurred between 1 and 2 years of age; 3 between 3 and 4; 8 between 4 and 5; 1 between 5 and 6; 2 between 6 and 7; 3 between 7 and 8; and 1 between 13 and 14. Of the two secondary cases, one occurred at six weeks of age, and one between 4 and 5 years. Secondary pleurisy is said, by the best authorities, to be most frequent between one and five years of age, being, in this respect, just the contrary of the idiopathic form of the disease.

Pleurisy is said to occur more frequently in boys than girls. Of 20 cases in which I noted the sex, 13 occurred in boys and 7 in girls. The idiopathic form is most apt to occur in vigorous and hearty subjects, while the chronic and cachectic forms attack those who are feeble and delicate. It is often, as already stated, a secondary affection, occurring particularly during pneumonia, and after that disease, during rheumatism, scarlet fever, and Bright's disease. *Season* is another predisposing cause. It is most common during winter and spring, especially the latter.

The *exciting causes* are very obscure in most cases. The only ones which seem to have been ascertained with any certainty, are exposure to cold and sudden changes of weather. It has been said to follow external violence. In one of the cases that came under my own observation, the child had struck the affected side severely against a pointed stick on the day of the attack.

Anatomical Lesions.—The serous membrane may retain its natural characters, which happens in the majority of cases, or it may present the different appearances indicative of inflammation. These are more or less minute and abundant injection and punctuation, and spots or patches of an ecchymotic appearance, observable particularly at the points where deposits of false membrane have taken place. Another change produced in the pleura by inflammation is the loss of its natural polish, which is replaced by a more or less granular and rough appearance. In chronic cases it becomes whitish or opaline in color, and thickened. It is very rarely softened.

In addition to the lesions of the pleura itself there are various diseased products of secretion which require notice. These may be either solid or liquid. The solid products are the false membranes which exist so generally in all serous inflammations. They are found both upon the costal and pulmonic pleura. In their recent state they are of variable size and thickness, being in some cases very soft and deposited in small points; in others, more extensive, but thin like paper; and in others again thicker (one or two lines in thickness), firmer, and decomposable into several layers. The outer layers are yellow, elastic, and soft, while the inner ones are red, more resisting, and marked with vascular arborisations. When examined some time after their formation, the false membranes are found to have been converted into cellular adhesions, which may be either very loose, or they may fasten the lung tightly to the costal pleura. The adhesions are generally, however, thin, transparent, and in the form of loose bridles. After a length of time, the false membranes come to present the appearances of true serous tissue, and like that, are susceptible of inflammation.

The fluid found in the pleural cavity usually consists of transparent or turbid serum, holding albuminous flocculi in suspension. Sometimes, but more rarely, it consists of purulent serum, and still more rarely of pure pus. The liquid generally occupies the lowest portion of the thoracic cavity, but is sometimes circumscribed at various heights, or between the lobes of the lung, by abnormal adhesions, or by some part of the lung which has been rendered incompressible by inflammation.

The lung presents various alterations from its healthy condition. It is pressed backwards towards its root to a greater or less extent. The tissue of the organ is generally found in one of two conditions: either hard, not crepitating, impenetrable to the finger, and presenting a smooth surface when cut into, a state of things which has been expressed by the term *carnification*, and which is a mechanical effect of pressure; or else the lower lobe, which is in contact with the fluid, is large, heavy, fleshy, rather hard, not so easily penetrable by the finger as in simple hepatization, yielding under pressure only a small quantity of blood, and but slightly retracted towards the spinal column. The latter condition depends in all probability on an effusion which has occurred after, or coincidentally with, hepatization.

In some cases, in which the effusion is but small, or where it has been absorbed, the lung is found to be elastic and crepitating. Whatever the amount of effusion may be, it is said that the lung can always expand to its normal size if the fluid be absorbed.

Pleurisy, whether complicated with pulmonic disease or not, is much the most frequently confined to one side. In idiopathic cases, it is more common on the right than left side; when it accompanies pneumonia, it is, on the contrary, more common on the left than right.

SYMPTOMS.—In describing the symptoms, I shall treat first of the physical, and then of the rational signs, and of the course of the disease.

The *physical signs* are exceedingly important, as they often constitute, especially in young children, the only means of recognising the disease. The *pleural friction sound* is less important than some other physical signs, as it is scarcely ever heard in children under five years of age, and only during the absorption of the fluid, as a general rule, in those above that age. *Bronchial respiration* may commonly be detected from an early period in the attack. At first it is heard during inspiration, but afterwards it exists both during inspiration and expiration, or in the former alone. In a majority of the cases it is heard over the posterior portion of the thorax, and upon one side only. At first it is audible over nearly the whole height of the affected side, while later in the disease, it can be perceived only at the inferior angle of the scapula or in the interscapular space. Its duration is variable; it may disappear in a few days, or last for a much longer time. In favorable cases it is usually replaced by feeble vesicular respiration, more rarely by friction sound, and sometimes by pure respiration. This sign is almost always present at all ages in acute cases, but is often absent in those which are slow and tedious. In suckling children it is not constant, but intermits occasionally, so that it may be heard at one and not at the next examination. *Ægophony* can rarely be detected in children less than two years old. Under that age, there is heard instead of it resonance of the cry, especially in the region beneath and on a line with the spine of the scapula. It is intermitting like the bronchial respiration. In children over two years old, ægophony can often be distinguished by careful examination, but never, of course, unless the quantity of effusion is considerable. It is heard at an early period of the attack, and chiefly in acute cases, and must be sought for in the lower portion of the interscapular space, and the inferior dorsal region. It coexists almost invariably with bronchial respiration, lasts but a short time, disappearing after one, two, three, or four days, and it is intermitting. In older children, it is sometimes replaced by diffuse resonance of the voice, as it is by resonance of the cry in infants. In one case that occurred to myself, in a girl between six and seven years old, and in which the disease became chronic, the voice was not purely ægophonic, but reedy and quavering, from the fifth to the tenth day. After that date the effusion became so great that all sound was suppressed.

Feebleness or absence of the respiratory murmur seldom exists at the beginning of acute cases, but in the subacute or chronic form is generally present from the invasion. In the latter class of cases feeble respiration is noticed first over the inferior portion of the dorsal region, but, as the effusion increases, it is heard also in the upper and anterior regions, and becomes more and more feeble, until at length no sound whatever is audible: the respiratory murmur is suppressed. In acute cases, on the contrary, the absence of the respiratory sound is observed at variable periods of the attack; when noticed soon after the invasion, it is generally coincident with bronchial respiration, which, heard at first over the whole or the inferior three-fourths of the dorsal region, becomes afterwards perceptible only in the interscapular space, or at the inferior angle of the scapula, while the respiration is feeble or absent over the lower portions of the lung. In acute cases the feeble respiration remains limited to the dorsal region, and disappears after a few days,—in from five to eight, according to my experience; while in chronic cases it extends over a larger surface, and continues for several weeks, or even months.

Percussion.—This means of diagnosis is very important in all cases of the disease accompanied by effusion of liquid, unless the quantity be exceedingly small. When, on the contrary, the inflammation results merely in the production of thin false membranes, percussion furnishes no useful information.

Percussion is of no assistance, however, at the moment of invasion, as it is not until the period at which effusion takes place, that the resonance of the thorax begins to be altered. In acute cases, the resonance is generally duller than natural, though seldom entirely dull, on the second, third, or fourth day. As the effusion augments, the dulness increases over the region occupied by the fluid, until at length all resonance ceases, and the sound is perfectly flat. The degree of dulness can be properly appreciated only by comparing the two sides together. The degree, extent, and duration of this sign will depend of course upon that of the effusion. In children as in adults, the sounds afforded by percussion vary with the position of the patient, which influences, of course, the situation of the fluid in the pleural cavity.

In regard to the physical signs of pleuro-pneumonia, it may be stated that when a pleuritic effusion takes place in a child laboring under pneumonia, it happens as a general rule, that the bronchial respiration occasioned by the inflammation of the lung increases in intensity, though in some few cases it is diminished or suppressed. MM. Rilliet and Barthez lay down the following principle: "that *when a pleuritic effusion occurs in a child affected with hepatization of the inferior portion of the lung, all the abnormal sounds which were perceptible over the diseased point are considerably exaggerated, and the sonoreity disappears.*"

Inspection of the thorax affords no assistance at the invasion of the disease, nor generally in acute cases which last but a short time, and in which the amount of effusion is small. When, however, the effusion is large, it may be observed upon close examination, that the movements of the affected side during respiration are more limited than those of the opposite one, and that the intercostal spaces are more projecting than natural, in consequence of distension by the fluid within. At the same time *mensuration* will show that the side on which the effusion exists is larger than the other. The difference may amount to one-third or two-thirds of an inch. In acute cases, in which the quantity of liquid is small, mensuration will of course show no difference.

Palpation is an important means of diagnosis, especially in making the distinction between pneumonia and pleurisy. In the former disease, the vibrations of the thoracic walls during either breathing or speaking, is augmented; whilst in the latter it is diminished, or when the effusion is considerable, ceases altogether. This sign is important, both in infants and older children.

RATIONAL SYMPTOMS; COURSE; DURATION.—Acute pleurisy is rarely met with, as already stated, in children under six years of age, except as a secondary affection. In idiopathic cases it begins with severe pain in the side, cough, some difficulty of respiration, increased frequency of the pulse, loss of appetite, thirst, bilious vomiting, sometimes headache, and in rare instances delirium. The *pain* in the side or *stitch*, is almost always present in acute cases occurring in healthy children, while in those which are slight, or which occur in weak and debilitated subjects, or very young children, it very often cannot be detected. Sometimes, however, its existence may be ascertained in very young children by tenderness of the side shown during the act of percussion. When present in young children, it can always be detected by watching the face of the child and observing its gestures, during the act of coughing, and during full inspirations, as in those made in crying, after sudden movement, or in the act of gaping. In an infant of thirteen months old, who was attacked with pleurisy of the right side, causing effusion of thick yellow pus into the right side, and which ended fatally in a month, only the blindest observer could fail to see that every act of coughing was acutely painful, for the child uttered each time a short, sudden cry, which was hushed as soon as given, while at the same moment there passed across the face an expression, amounting almost to a grimace, of suffering, which was unmistakable. The pain is aggravated by coughing, by full inspirations, by change of position, and by percussion. The seat of pain is almost always in front, but it may extend irregularly over the whole of one side, to the arm, or it may be confined to the false ribs, or less frequently to the neighborhood of the nipple; it generally lasts from three to six days, though it sometimes continues longer. This symptom was complained of in most of the cases that I have seen. In some it was very acute and severe for one or two days, while in others it was slight, not well defined, and very transitory. In one, the child said there was no pain, but a sensation of weakness in the side, when she coughed. In another the pain was severe for a few hours, but was relieved by a sinapism, and was not felt again, though the attack resulted in a very large effusion into the side. In a third it lasted a week, and in a fourth only two days, though in both the effusion was extensive, and required several weeks for its absorption. In a fifth case, it continued for five days. In the last, the effusion was very slight. It was aggravated in all these cases by coughing, by the act of respiration, especially when this was deep, and by motion.

Cough exists in nearly all idiopathic cases, and generally from the onset, though sometimes not before the second or third day. Usually frequent and dry, it commonly retains these characters in acute cases, for four or six days, and then diminishes rapidly. In more tedious cases it continues for a longer time, but moderates in violence after some days. In secondary cases it has no special characters. It was present in all the cases seen by myself but one. Its character varied very much. In some it was frequent, teasing, and very painful. In others it was rare, scarcely troublesome, and only slightly painful. In all it was very dry, this constituting one of its most marked features, and giving it a very different character from the cough of bronchitis, and also, though somewhat less distinctively, from that of pneumonia. It continued almost entirely dry throughout the disease, except in a case which became complicated after a time with slight bronchial inflammation, and, in that, it became loose. There is generally no *expectoration*; if any, it consists of a small amount of whitish, frothy, sero-mucous fluid.

The *respiration* is usually accelerated in acute cases, but remains natural in other respects; the dyspnœa, however, is slight, as a general rule, compared with that of pneumonia. The difficulty of breathing is commonly in proportion to the earliness of the age, and to the extent and rapidity with which the effusion takes place. In the acute cases that came under my own observation, the breathing was usually about 36, 38, 40, and 48, but in one case it rose to 68 for a single day. It was not labored, and appeared to be difficult only from the fact of its being more or less painful. In a case of double pleurisy that came under my observation, it was most laborious, and dreadfully painful, as was also the cough. In the cases attended with but slight pain, there was no dyspnœa. It usually subsided after two or three days, when large effusion took place, converting the case into the chronic form.

The *fever* is not usually very great, and seldom lasts more than a few days, or a week. In some few cases, however, that I have seen, the febrile reaction has been very high. In one, in a child between three and four years old, the pulse rose to 172 on the first day, though the respiration was but 36; the skin was very hot and dry, and there was very great drowsiness and inattention. In other cases the pulse was 140, 128, and 124. The acceleration of the pulse usually lasts three or four days, after which it falls, so that by the end of a week it is seldom over 70, 80, or 90. The *heat* of skin is not very great in most instances, and generally subsides rapidly and disappears after a few days. In acute secondary attacks, the febrile symptoms are more marked as a general rule, than as has just been described, because of the existence of the concurrent disease.

The *countenance* presents no particular characters, except that an expression of pain passes across it occasionally when the child coughs, or takes a deep breath. It is seldom deeply flushed as in pneumonia. The alæ nasi are dilated only during the continuance of the difficulty of respiration.

The *decubitus* is generally dorsal or indifferent. In two cases observed by myself, in which the effusion was large, the number of inspirations was always from three to five greater when the child laid on the *sound*, than when on the affected side.

Headache is often present during the first few days, in children over six years of age, and is sometimes very severe.

Convulsions are said to occur sometimes at the onset in very young children. The *strength* is not usually much diminished, except during the acute period. The *appetite* is diminished and the *thirst* acute, but neither of these symptoms is so marked as in pneumonia. The *tongue* is usually moist, and sometimes covered with a coat of whitish fur; the *abdomen* is natural.

Bilious vomiting is said to occur in more than half the cases. The *stools* are generally regular, or there is some constipation.

Auscultation practised soon after the invasion generally reveals rude or bronchial respiration without any rhonchus. The percussion is dull. The cough, pain, fever, and difficulty of breathing continue for several days, after which all but the cough generally disappear, while that commonly persists in a mild form. In acute cases, the appetite now begins to return, the thirst moderates, and auscultation reveals only feebleness of the respiratory murmur and slight dulness on percussion. The general symptoms cease soon after this, and the patient is entirely convalescent in from one to three weeks, though feeble respiration and diminished sonoreity sometimes persist for a longer period.

Chronic pleurisy may follow the acute form, or occur as an idiopathic disease. In the former case, the acute symptoms diminish after a variable length of time, but the fever does not cease entirely and often recurs towards evening. In the latter case there is usually a very moderate degree of fever at first, which soon subsides and then disappears, or there is none at all; the pain is generally, though not always, vague, uncertain, and attracts but little notice. In one case that I attended, the cough was frequent, rather dry, and very painful for the first few days, after which it became looser and ceased entirely, though the inferior two-thirds of the right side were filled with effusion for a period of two weeks afterwards. In a second, in which the whole of the left side was occupied by the effusion, there was no cough whatever; neither the mother nor myself ever perceived any. In a third, there was a very slight, infrequent cough during the first day, but after that, though the effusion occupied the right side up to the spine of the scapula, there was none through the day, and merely a little hacking at night. In a fourth, in a girl, between four and five years old, there was considerable fever during the first week, but literally no local symptoms whatever, so that the case was mistaken for one of bilious fever by another physician. When it came under my notice, some obscurity in the symptoms led me to examine the chest, where I found an effusion occupying the lower third of the right side. The fever was now diminishing, and soon disappeared, but the effusion increased, without pain, and with only an occasional cough, until it filled up three-fourths of the side. It then stopped, and after several days, began to recede. At the end of about six weeks, the child was quite well again, and continues so to this time, about three years. In a fifth case, in a boy, between five and six years old, the attack was extremely obscure. There was very slight fever, almost no cough, in fact none except upon some exertion being made, and then scarcely noticeable, and no severe pain whatever. In fact, the child complained of no pain whatever, but upon being asked, referred to an uneasy sensation in the inferior lateral region of one side. The tongue was coated; and the symptoms were rather those of some bilious derangement, than of anything more serious. It was not until after four or five days of attendance, that a careful examination of the chest showed the existence of a slight effusion in the right side. This gradually increased until it reached nearly up to the clavicle, and then slowly disappeared again. The respiration is somewhat accelerated in all cases, and when the effusion is very large, and especially when it is purulent and attended with violent hectic fever, it is sometimes excessively labored and difficult. In the cases that I have seen, however, even when the effusion has been very large, the breathing has not been difficult. In one case it was between 40 and 50 during the first two days, after which it fell, as the effusion took place, to 30. In a second it was 45 at first; at the end of a week it was 38; at the end of the third week, as the effusion was being absorbed, it had fallen to 28, soon after which the recovery was completed.

In a third it was so slightly disturbed that I did not at first suspect any disease of the chest. On the fourteenth day, the effusion reaching then nearly to the spine of the scapula, the breathing varied between 40 and 28 during sleep, but during the waking state there was no visible oppression.

The effusion takes place gradually, and is generally large. The percussion is now entirely dull over a greater or less extent of the side, and the respiratory sound is suppressed. The side is evidently enlarged, the increase of size being visible to the eye and ascertainable by measurement. If the effusion be purulent, constituting empyema, and the case is to end unfavorably, the child emaciates, grows pale, has night-sweats and hectic fever, and dies at last in a state of profound exhaustion. In favorable cases, on the contrary, and nearly all those in which the effusion is sero-albuminous belong to this class, the effusion is gradually absorbed, and the patient recovers with a contraction of the side. In some rare instances the fluid has been evacuated by an opening through the parietes of the thorax, caused by ulceration or made by a surgical operation; and in others again by an opening into the lung, through which the fluid has been expectorated. In one case that came under my own observation, in which the effusion was purulent, a natural cure took place by the evacuation of the fluid through an opening in the walls of the chest. This case occurred in a very hearty boy, of between four and five years of age. He was taken sick in the country, with what was supposed to be an attack of typhoid fever. After many weeks of violent illness, an abscess showed itself in the neighborhood of the left nipple. This, at the end of two months, discharged, and the patient began to improve. At the end of three months he was brought to town, and I saw him. I found a fistulous orifice, discharging occasionally considerable quantities of pus, just below and inside of the left nipple. The left side was very much contracted, and the lung was retracted into the upper part of the chest. He was put on cod-liver oil, wine, and nutritious food, and gradually improved. He was soon removed to the country, and I did not see him again, but have since heard that he had entirely regained his health. The recovery by absorption has been known to take place two and five months after the invasion. In one case that I saw, the duration from the time when the effusion took place to its complete absorption was five weeks; in a second it was between six and seven weeks; in a third, six weeks; in a fourth, seven; and in a fifth, two months.

DIAGNOSIS.—Pleurisy may be confounded with pneumonia or hydrothorax. From the latter affection it is to be distinguished by the absence of pain in that disease, by the existence of the effusion on both sides of the thorax in most cases, and by the fact that hydrothorax generally follows as a consequence of some previous disease, particularly the eruptive fevers or nephritis.

The distinction between acute pleurisy and lobar pneumonia is more difficult than that between pleurisy and hydrothorax, and in some instances is subject to considerable doubt. It may generally be arrived at, however, by attention to the differences laid down in the following table, which is taken from the Bibliothèque du Médecin Praticien.

ACUTE IDIOPATHIC PLEURISY.	ACUTE IDIOPATHIC PNEUMONIA.
Frequent after six years of age; rare under that age.	Frequent after six years of age; more rare under that age, but much less so than pleurisy.
Begins with dry cough, sharp thoracic pain, bronchial and metallic respiration during inspiration, either on the first day or later, and more rarely with obscurity of the respiratory sound.	Begins with cough, slight thoracic pain, and crepitant or subcrepitant rhonchus; at a later period there is bronchial respiration during the expiration and bronchophony.
Modification of the physical signs by change of position.	No modification under like circumstances.
Fever and acceleration of the respiration usually moderate. Rapid diminution of these symptoms from the fourth to the seventh day.	Fever violent; considerable acceleration of the respiration. Diminution of these symptoms less marked, less rapid, and not before the sixth or ninth day.
Expectoration absent or very slight.	Expectoration mucous, sometimes sanguineous, very rarely rust-colored.
No rhonchi.	Rhonchi preceding, following, and often accompanying the bronchial respiration.
Absence of vibration of the thoracic parietes during speaking or crying.	Augmentation of vocal resonance very sensible in older children, and in a less degree in all.
Course of the disease irregular; rapid disappearance in some cases, prolonged duration in others. The bronchial respiration is substituted or masked by feeble respiration.	Course of the disease regular; steadily increasing, in most cases, and then diminishing from the sixth or ninth day. Bronchial respiration more disseminated.

The chronic form of pleurisy with extensive effusion, may be easily distinguished by the history of the case, by inspection, palpation, and mensuration of the chest, by the nearly total absence of sonoreity and of the respiratory murmur except at the inner edge of the scapula, and by attention to the character of the general symptoms.

Prognosis.—Acute pleurisy is rarely a fatal disease in healthy subjects. When it occurs as a complication of some other malady, on the contrary, it is much more apt to terminate unfavorably. The degree of fatality in secondary cases will depend, of course, in great measure, on that of the primary disease. Pleuro-pneumonia is a more dangerous disorder than either alone. Of 5 cases of primary pleuro-pneumonia, observed by Rilliet and Barthez, 2 died; while of 10 secondary cases, 8 died.

Of the 21 cases that I have seen, 3 died. The three fatal cases were all primary; two of them occurred in infants, one at 6 weeks, and the other at 13 months, and the third was a case of double pleurisy in a boy between four and five years old. Of the 18 children that recovered, the two youngest were between 3 and 4 years of age, while eight were between 4 and 5 years of age, and the remainder over that age. In my experience, therefore, the youngest were those which died, as might have been expected.

Chronic pleurisy is generally a serious, and not unfrequently, a fatal disease. Of 5 cases, observed by the authors, MM. Rilliet and Barthez, 2 proved fatal.

TREATMENT.—The *hygienic treatment* in this, as indeed in all the diseases of children, is of the utmost importance, and ought to be regulated by the practitioner himself. In all forms of the disease, the child should be carefully protected from cold, and in the acute form, kept at rest, and if possible, in bed. The diet must be very strict, and should consist for a few days of nothing but the weakest preparations of milk. After the fever has disappeared, bread and milk, vegetable soup with a few oysters boiled in it to make it agreeable, and gradually rice, potatoes, and at last small quantities of meat, may be allowed. In the chronic form the diet ought to be less strict, but regulated with equal care, as to quantity and material. In that form the patient should be taken into the air if the weather be mild and dry, and in winter the chamber ought to be well aired from time to time.

Bloodletting.—Depletion ought to be employed in acute pleurisy, as a general rule. Blood may be drawn either by venesection, cups, or leeches, the quantity to be regulated by the age and constitution of the patient. Venesection is preferable to local depletion, unless there be some contra-indicating circumstance. From four to six ounces may be taken generally from a child between four and six years of age. It is seldom necessary to repeat the operation; when, however, the acute symptoms are not at all relieved by the first detraction, it would be proper and useful to resort again to a small venesection, to leeching, or to take two or three ounces of blood by cups, as recommended in the article on pneumonia.

Depletion ought to be avoided in most of the secondary cases, unless the symptoms are very acute and the child strong and vigorous; also in all chronic cases, after the febrile symptoms have been dissipated, and in feeble, delicate children, or, if resorted to in these, it should be used with very great circumspection.

Antimonials.—A moderate use of the antimonials is of great service in the acute stage of the disease. Small doses of antimonial wine and sweet spirits of nitre, or fractional doses of tartar emetic, as recommended in the article on pneumonia, will generally cause the fever, dyspnœa, and cough to subside rapidly. Large doses seem to be unnecessary in any case, and are liable to be injurious in many.

Alteratives.—Many writers recommend the habitual employment of the mercurial preparations in connection with bloodletting. It seems to me, however, that they are, to say the least, seldom necessary in acute cases, since the majority of these are nearly certain to recover without a resort to them; and it is better, as has already been said, to avoid the use of mercury in children when there are other and less powerful remedies which may be resorted to instead. When, however, acute pleurisy tends to assume the chronic form, and in confirmed chronic cases also, they would seem to be more clearly indicated, though under such circumstances, I have succeeded in curing my own cases, as I shall presently show, without a resort to them. Nevertheless, calomel combined with digitalis, has been recommended by very high authority under these circumstances. From a quarter to half a grain of the former, with a quarter of a grain of powdered digitalis, may be given every two or three hours.

The remedies employed by myself after the disappearance of the acute symptoms, and when the effusion had taken place, was either iodide of potassium in syrup of sarsaparilla, according to the following formula:

℞—Potass. Iodidi, ...	grs. xvi.
Syrup. Sarsap. Comp.,	
Aquæ, ...	ãã ℥i.—M.

Dose—A teaspoonful three times a day.

or, the syrup of the iodide of iron, of which from thirty to sixty drops should be substituted for the iodide of potassium in such a mixture as the above. The iodide of potassium is preferable in the early stage. After a time, and especially in anemical and delicate patients, the iodide of iron should be substituted. Under this treatment, combined with the application of a Burgundy pitch plaster to the side, or some other form of counter-irritant, the effusion disappeared in from two to eight weeks, though diuretics had failed to make any impression on the cases.

Diuretics are highly recommended in the treatment of cases in which effusion has taken place. Those chiefly employed are squills, digitalis, and nitre. The squill is given alone, or in combination with calomel or digitalis, or with both. The dose of the powder of squill or digitalis is about a quarter of a grain every two or three hours. The squill may be used also in the form of syrup or oxymel, and the digitalis in tincture. These two substances may be employed in the following formula:

℞—Acet. Scillæ, ...	ʒii.
Tinct. Digitalis, ...	gtt. xxx.
Aquæ Fluvial., ...	℥iv.—M.

Of this a teaspoonful is to be given three or four times a day to children two years old. This formula was made use of for several days in two of the cases referred to, without any perceptible diminution in the amount of the effusion, whereupon it was suspended, and the iodide of potassium, and afterwards the iodide of iron, as above recommended, substituted, and with much better effect.

Purgatives ought to be used during the acute stage of pleurisy to an extent sufficient to keep the bowels soluble, and to act as mild evacuants. In chronic cases, on the contrary, they are particularly recommended as evacuants, in order to deplete the bloodvessels, and thus hasten the absorption of the effusion. So far as my experience goes, this treatment is unnecessary, as diuretics and alterative tonics are generally sufficient, without a resort to violent remedies which must irritate the intestinal mucous membrane, always extremely susceptible in children, to a dangerous degree.

External remedies.—Blisters are very generally employed in the acute form to relieve pain and dyspnœa, and in the chronic to hasten the absorption of the effused liquid. I did not apply them in the cases under my charge, having succeeded very well without; but would not hesitate to make use of a small one applied for a not longer period than two hours, if the pain and oppression continued after sufficient depletion and the use of antimonials. In chronic pleurisy, the application of a large Burgundy pitch plaster, made rather weaker than what is used for adults, and large enough to cover nearly the whole side, would be preferable to blisters.

Tonics are often necessary in chronic, and sometimes after the febrile symptoms have subsided, in acute cases occurring in feeble and delicate children. The most suitable are quinine, in the dose of a grain morning and evening, small quantities of very fine port wine, and the preparations of iron.

Paracentesis.—When, in chronic pleurisy, the effusion is very large; when there is no disposition to absorption, notwithstanding the use of proper remedies; when the child is becoming very much debilitated, and is attacked with hectic fever and night-sweats, the operation of paracentesis has been recommended by very high authority, and has been performed with entire success on several occasions. M. Heyfelder (*Arch de Méd.*, 3ème serie, t. v. p. 59) performed it in one case eight weeks, and in another four months and a half, after the beginning of the attack. Both cases recovered; the lung expanded again, the opening closed, and the respiration was nearly alike over both sides.

Case of chronic pleurisy of the left side, beginning with acute symptoms; extensive effusion with displacement of the heart to the right of the sternum; recovery.—February 12th, 1846.—The subject of the case is a boy four years old, of delicate stature and appearance, but enjoying good health. I saw him first at 1 P.M. He was perfectly well yesterday, slept soundly last night, and rose apparently in good health this morning. He ate his usual breakfast, but complained afterwards of feeling unwell. Soon after this he complained of headache, of soreness and weakness in the knees in going up stairs, and then of violent pain in the left side beneath the armpit.

At the time of my visit he was in bed, in the following condition: Pulse 130, full and strong; skin warm and moist; headache; sharp, severe pain at the præcordia, extending backwards under the arm-pit, and aggravated by motion, crying, and by deep inspirations; respiration quick and jerking. No cough at all, absolutely none. Abdomen natural; neither vomiting nor diarrhœa. Tongue slightly furred, moist. Action of heart violent; impulse strong, and felt over a large space; sounds loud and strong; to the left and beneath the nipple, a soft murmur in second sound. Percussion dull over a larger space than natural.

Behind, percussion dull over whole of left side; natural on right side. Respiration natural on the right side; feeble and indistinct, without bronchial sound on the left.

Ordered a teaspoonful each of extract of senna and syrup of rhubarb, to be given immediately. To have a warm bath in the evening, and to take one of the following powders every two or three hours, beginning in the evening.

℞—Pulv. Opii et Ipecac., ... grs. iij.
Potass. Nitrat., ... grs. vi.
In pulv. no. vi.

February 13.—Passed a restless night. Better to-day. Pulse 130, softer; skin moist. Impulse of heart less violent. Pain not so severe. Respiration still quick, and when the child is excited or irritated, it becomes jerking, while at other times it is quiet. Physical signs as before, except that the murmur in the second sound of the heart is no longer heard. Ordered three ounces of blood to be drawn by leeches from the left side; powders to be continued so as to allay restlessness and pain.

February 14.—Has had a better night. Pulse less frequent. Respiration 30, and without jerking; no cough at all; makes no complaints of pain. The appetite is returning.

February 15.—Better in all respects; no fever nor pain; no cough. Physical signs as before.

The case went on until the 27th of March, when I paid my last visit, making the whole duration of the case over six weeks. During the last two weeks of February, there were no acute symptoms. The fever had disappeared entirely. The respiration continued, however, from 28 to 30 during all that time. The effusion occupied nearly the whole of the left side, which was manifestly larger than the right, and the intercostal spaces were protruded. Behind, there was total flatness on percussion from the spine of the scapula downwards, and in front from a short distance below the clavicle. The respiratory murmur was absent in the lower three-fourths of the dorsal region, and feeble above. In front, respiration was heard only above and just beneath the clavicle. In the course of this period, the heart was gradually forced over to the right side of the sternum, so that at last its impulse was felt, not to the left, but to the right of the sternum. The cardiac sounds were loudest and most distinct in the same region. The displacement was so remarkable that the mother discovered it herself, I having avoided telling her, to save her from anxiety. The new position of the heart did not seem to produce any inconvenience, in addition to that occasioned by the pleuritic effusion. During the last two weeks of March, the child was kept in bed; his diet was milk and bread; a large Burgundy pitch plaster was kept on the side, and he took internally vinegar of squills, and tincture of digitalis.

Finding that the effusion remained stationary under this treatment, I prescribed a grain of iodide of potassium three times a day, in a teaspoonful of compound syrup of sarsaparilla. The diet was changed at the same time. He was allowed small quantities of meat every day, and was taken from bed and placed in a chair by the window. Under this treatment, he gradually improved, so that by the 27th of March, when I paid my last visit, the effusion had in great measure disappeared, and he was able to play about the room all day. The side was slightly contracted; the respiration was pure and vesicular, but rather more feeble than on the left side; the heart had returned to its natural position.

I examined this child in the course of the year 1852, and found him to be in excellent health. Excepting a slight contraction of the left side, there was no perceptible difference between that side and the right.

ARTICLE V.

HOOPING-COUGH, OR PERTUSSIS.

Definition; Synonymes; Frequency.—Hooping-cough is characterized by a hard, convulsive cough, occurring during expiration, and accompanied by long, shrill, and laborious inspirations, which are called hoops. The cough occurs in paroxysms, which are terminated by the expectoration of tough phlegm and often by vomiting.

The disease is known by various other names, of which the most common are tussis ferina, chincough, and kincough. The *frequency* of the disease is exceedingly variable, as it occurs both in the sporadic form and as a widely prevailing epidemic. Some idea of its frequency may be gained from the facts that during the five years from 1844 to 1848, inclusive, there were 890 deaths from it in Philadelphia, under fifteen years of age. During the same time there were 772 deaths from pneumonia; 756 from croup; and 618 from bronchitis.

CAUSES.—AGE.—It occurs generally in children. Of 208 cases in children, in my own private practice, 26 occurred in the first year of life, 147 between the ages of 1 and 7 years, and 35 between 7 and 12 years. To be more explicit, I will state that of 188 cases in which the age was accurately noted, 11 occurred in the first six months of life; 9 between 6 and 12 months; 30 in the second year; 17 in the third, 32 in the fourth, 17 in the fifth, 30 in the sixth, 16 in the seventh, 13 in the eighth, 8 in the ninth, 3 in the tenth, and 1 in the eleventh and twelfth years of life each. Of 130 cases in children, collected by M. Blache, 106 occurred between 1 and 7 years of age, and only 24 between 8 and 14. Of 29 cases observed by MM. Rilliet and Barthez, there were 26 between 1 and 7 years, and 3 between 8 and 12. It is stated by MM. Blache, Rilliet and Barthez, and Valleix, to be most common in girls. Of 208 cases observed by myself, 106 occurred in boys, and 102 in girls. Some writers have asserted that certain *constitutions* and *hereditary influence* predispose to the disease. So far as my own experience goes, it has seemed to attack indifferently those who were simultaneously exposed to it. The fact of its being propagated by direct *contagion* is proved beyond doubt by numerous observations. I have rarely known one child in a family to be attacked without its extending to all the others not protected by having had the disease previously. That it often appears also in the form of an *epidemic*, is established by the testimony of many writers, so that at present no doubt is entertained upon this point.

SYMPTOMS.—It is customary to describe three stages of hooping-cough. The first is called the stage of invasion, or the catarrhal stage; the second the stage of increase, or the spasmodic stage; and the third the stage of decline, which is characterized by an amendment of all the symptoms.

First stage.—The great majority of the cases begin with the ordinary symptoms of simple catarrh. These are coryza, sneezing, slight injection of the conjunctivæ, and dry cough. The cough rarely has any peculiarity in the beginning which will enable us to distinguish it from that of an ordinary cold, though some persons have asserted that they could recognise it. I have often listened with great care to the sound of coughs which parents supposed might be hooping-cough, but was always obliged to confess my inability to determine, until time gave them more decided characters. In addition to the symptoms enumerated, there is generally more languor, lassitude, drowsiness, and irritability, than are commonly present in simple catarrh. In a small proportion of cases the first stage is wanting, and the disease assumes its peculiar features from the first. The duration of this stage is very uncertain, and is ascertained with difficulty. My own experience would fix it at about two weeks as the average, though it may last undoubtedly a much shorter or longer period. The earliest period at which I have known the distinctive hoop of the disease to be heard was in three days. In another case it was five days. I have also known it to appear at a later period than usual. In a good many instances it has been as late as three weeks, but very rarely later.

Second stage.—At the beginning of this stage the disease has assumed its peculiar convulsive and paroxysmal character. It consists of violent fits or paroxysms, or, as they are often called, kinks of cough, recurring after longer or shorter intervals. Just before the paroxysm the child seems restless, anxious, and irritable, or else keeps perfectly quiet and evidently tries to rétard its approach. When it begins, the child, if lying down, rises up suddenly, or if playing about runs to take hold of some fixed object, by which to support itself during the accession. The cough is dry, spasmodic, and sonorous, and occurs in a succession of short, rapid expirations, by which the thorax seems to be emptied of all its air, with violent efforts. It is followed by one or two long and deep inspirations, which are accompanied by the peculiar hoop to which the disease owes its name, and which are caused by the drawing of the air rapidly and forcibly through the narrowed glottis, which is spasmodically closed. During the fit the face becomes deeply suffused or even purple, and swollen; the eyes are watery, and the countenance is expressive of great anxiety, and after the fit is over, of fatigue and exhaustion. The latter symptoms are, as M. Valleix remarks, the signs of partial asphyxia, and are the result doubtless of the complete expulsion of air from the thorax, and a consequent partial suspension of the function of hæmatosis. There is almost always an expectoration of colorless ropy fluid, often accompanied by vomiting, at the close of the fit of coughing, and the patients usually appear weak and languid for a short time, after which they return to their play.

In very severe cases there are other symptoms in addition to those just mentioned. *Hemorrhages* from the mouth, ears, nose, lungs, and beneath the conjunctivæ, are not unusual. I have myself seen several instances of epistaxis, one of effusion into the eyelids, a few of extensive subconjunctival ecchymosis, and I am well acquainted with the history of another case, in which there was bleeding both from the nose and ears. In one case, in a girl between five and six years old, that occurred to myself, in which the paroxysms were violent, the spells were accompanied in the latter half of the fourth and in the fifth week, by a discharge of a good deal of blood from the mouth. This took place particularly during the night-spells, so that in the morning the basin would contain several teaspoonfuls of blood. It was not from the nose. It was bright in color, pure, except that it was intermingled with sero-mucous expectoration, but it was not intimately blended with the sputa, nor was it streaked through the mucus as it sometimes is in the pneumonia of children. On one occasion it was seen to fly from the mouth in a little spirt, as though from a vessel. The child was lively and well all this time, playing about, eating well, strong, not thirsty, without pain, not oppressed between the spells, and sleeping naturally between the paroxysms at night. The only altered physical sign was slight dulness on percussion over the upper part of the right lung behind, with some subcrepitant râle at that point, but without bronchial respiration. After lasting twelve days, it ceased; the child got well gradually, and continues strong and hearty to the present time (1857). The attack occurred in January and February of 1849. In another, in a girl two years of age, which came under my own observation, a species of syncope, a state of insensibility without convulsive movements, accompanied by great paleness, occurred after many of the paroxysms.

I have met with general *convulsions* in 12 cases, 5 of which proved fatal. In two other cases, both occurring in infants under six months, the paroxysms of cough were accompanied by the most violent struggling and oppression, and by deep blueness of the hands and feet, like that of severe cyanosis.

In some instances, after the paroxysm is apparently over, the child will begin within a few instants to cough again, and may in this way have several fits in such rapid succession as to make an almost continuous paroxysm. It is quite common for this to happen twice, and in one case which I saw, it occurred three times on several occasions. The ordinary *duration* of a paroxysm or kink, is from a quarter to three-quarters of a minute, though it may last as long as two minutes, or according to some even longer. In a case that occurred to myself, one paroxysm lasted the extraordinary period of fifty-five minutes. That it was really a paroxysm of the disease, I am quite sure, as it chanced that I reached the house shortly after it began, and witnessed the greater part of it myself. The number of accessions in twenty-four hours is very irregular. It depends chiefly on the stage and violence of the attack. During the height of the disease, I have generally found them to number about 40. In some rare cases, however, they are much more numerous, and amount to 70 or 80. They are generally most frequent in the course of the third or fourth week, after which they remain stationary as to frequency for several days or for two or three weeks,and then decline gradually. The paroxysms may occur spontaneously, the child being often disturbed from sleep by their sudden occurrence, or they may be excited by various circumstances, such for instance as contrarieties, a fit of crying, change of position, eating, violent exercise, and imitation. I have frequently seen an attack brought on by the sight of another child in a paroxysm of the disease. The duration of the second stage may be stated to be about 30 or 40 days in most cases.

Third stage.—It is impossible to fix a precise limit from which to date the beginning of this stage. It is generally, however, said to commence from the time when the disease is evidently on the decline. The paroxysms now grow less frequent and less violent, the cough reassumes some of the catarrhal features which it had at first, and gradually loses its peculiar spasmodic character. The child's general health improves, the appetite becomes vigorous, the strength is invigorated, the sleep again becomes sound and tranquil, and the disease disappears. The *duration* of this stage, is uncertain, like that of the two others. MM. Rilliet and Barthez state it to be short in uncomplicated cases (ten to fifteen days), and are of opinion that when it has been supposed to have lasted several weeks or months, it has been the result of some complication, as chronic dilatation of the bronchia, tubercular disease, &c. It happens not unfrequently, however, that after the disease has apparently ceased, all the distinctive characters of the cough recur, if the child chance to take cold within a few weeks or even longer after its disappearance.

In cases of pertussis unaccompanied by complications of any kind, there are no marked *general symptoms*. There is seldom any fever, the appetite continues good, and with the exception of occasional languor and fatigue, and irritability of temper, the child appears to be well.

The *total duration* of the disease, in simple cases, may be set down at from one to three months. I have never known a case to last so short a time as a month, and have rarely found the whole duration much within three months.

COMPLICATIONS.—Though it has happened to me, on several occasions, to meet with children who have been very ill from the violence of the disease under consideration in its uncomplicated condition, I have never known a case to prove fatal except in consequence of some kind of complication. It is exceedingly important, therefore, that the various accidents apt to occur in the course of the disease should be carefully considered.

Convulsions.—This complication is not a rare one, since it occurred in 5 of 29 cases observed by MM. Rilliet and Barthez, and in 12 of 208 observed by myself. It is one of the most dangerous accidents liable to occur in the course of the disease. Of the 7 cases reported by the authors quoted (5 of their own, and 2 belonging to M. Papavoine), 6 died. Of my 12 cases 5 died. In all that I have seen, the convulsions were general, extremely violent, and accompanied by insensibility in the fatal cases to the last, and in the favorable ones, during from a few minutes to half an hour. In two of the fatal cases the pertussis had lasted nearly two months, and was accompanied by extensive bronchitis. The fatal event took place within twenty-four hours from the supervention of the spasms. The subjects were eight and nine months of age respectively. In the third case, the convulsions came on in the seventh week of the disease, in a child who had been laboring for a number of days under bronchitis. They ended fatally in seven hours. In the fourth they occurred in a child in the second year of its age, at the end of about four weeks, proved fatal in two days, and were caused by bronchitis and collapse of the lung-tissue. In the fifth case they occurred likewise in a child in the second year of life, were attended with violent laryngismus and contraction, and proved fatal in the third week of the disease.

One of the favorable cases occurred in a child five months old, who had been attacked with bronchitis three days before the occurrence of the convulsions, which came on during the height of a severe paroxysm of coughing. The convulsive movements were general, and continued for about half an hour, after which the child was drowsy or irritable for some hours longer. The hooping-cough continued to be severe for two weeks after this, as many as 42, 46, and 48 paroxysms occurring every day. At last, however, perfect recovery took place. The second favorable case was that of a girl between two and three years old, in whom a convulsion occurred in the third week of the disease, before the paroxysms had become violent, and evidently in consequence of an attack of fever dependent upon dentition. The seizure lasted only a few minutes, was followed by drowsiness for a few hours, but on the following day all the unpleasant symptoms had disappeared. In a third case, in a boy between two and three years old, a violent convulsion occurred at the end of the second week, at the beginning of an attack of pneumonia. The child remained very ill, and nine days afterwards had another convulsion, which was much slighter than the first. After this he gradually recovered. In a fourth case, in a girl between two and three years old, a slight but well-marked convulsion occurred at the onset of an attack of bronchitis, which took place at the beginning of the third week of the hooping-cough. The bronchitis proved to be very severe, but there was no return of the spasm, and the child recovered. In a fifth case, in a boy nine months old, a severe fit occurred in the sixth week, just after the child had been brought home from an expedition to procure his daguerreotype. It lasted fifteen minutes, and was attended with total insensibility, and purple discoloration of the face, but in half an hour after, the patient was nursing well, and was entirely conscious. There was no return of the convulsions, though the disease was very severe after this attack. In the sixth case, also in a boy nine months old, a slight convulsion occurred during one of the paroxysms in the fifth week, but was not followed by any bad consequences.

Amongst the complications ought to be ranked, I think, though this has not generally been done by writers, an excessive degree of the laryngismus which constitutes one of the natural and essential features of the disease. In some children, in fact, and especially in those of a nervous temperament and in the anemical and debilitated, and, likewise in certain epidemic types of the disease, this laryngismus assumes a degree of severity, which is not only distressing but positively dangerous. In one case that occurred to myself, in a child who had suffered many months before from laryngismus and contracture, the occurrence of hooping-cough reproduced the laryngismus, and after a few weeks caused death almost instantaneously, at the beginning of a paroxysm, as the child was sitting upon the floor, where it had been placed only a few moments before to play, it having presented before this, no very threatening symptoms. In another case, in which I could detect no other complication, the spasm of the glottis was so very violent, that after a few days the spells were attended with convulsions, and very soon ended fatally. In a third, this symptom was so violent that in many of the spells the child ceased for the time to breathe, seemed to faint, became entirely unconscious, and had to be fanned and carried to an open window to be revived; this patient ultimately recovered. In a great many cases, this symptom without other complication, has been most distressing, and has required particular treatment.

Collapse of the lung-tissue.—The recent discoveries in regard to the pathological change in the pulmonary tissue called collapse, and especially a consideration of the causes by which collapse is produced, might well lead us to suppose that pertussis, and especially the bronchitis of pertussis, would be very apt to become associated with collapse. Late researches accordingly show that of all the lesions met with in hooping-cough this is much the most frequent and important. Dr. Graily Hewitt, of London, in a lecture on the pathology of hooping-cough, read before the Harveian Society of London, in 1855, shows "that the catarrhal inflammation of the bronchial tubes, which occasion hooping-cough, is, in fatal cases, attended almost universally with collapse of the lungs." He states that his observations, were made upon nineteen subjects; whose age varied from four years to one month, the average being eighteen months. "In all, the state of the lungs was carefully noted. The chief lesion found after death was collapse of the lung substance. The following is a statement of the degree to which this pathological condition manifested itself in the different lobes of the two lungs.

In the *right lung*, portions of the upper lobe were found collapsed in six cases, and in four more to a less degree. The middle lobe was collapsed, wholly or in part, in sixteen cases. The lower lobe was more or less affected with collapse, in eighteen cases. In the *left lung*, the upper lobe presented the same lesion in fifteen cases, the whole of the anterior tongue-like prolongation being in most of the cases affected. The lower lobe was collapsed more or less in eighteen cases. In seven of the cases, the portions collapsed were also congested, in some to a high degree.

"The test of MM. Bailly and Legendre, viz., the inflatability of the portions of the lung thus affected, was used in almost all the cases; and on that and other grounds, it was determined, that the particular part of the lung in question was collapsed and not hepatized.

"It will be at once perceived, that the occurrence of collapse was almost universal; all the cases, with the exception of one, in which there was extensive tuberculisation of the lungs, presenting a greater or less amount of lung substance affected in this manner."

I have had but few opportunities of testing this matter for myself by post-mortem examinations, but in one case to which I was called in consultation, that of a boy not quite a year old, this lesion was shown, by autopsy, to be present to a great extent. The child had had the disease during three months with considerable severity. He was thought to be doing well, until he was taken one day a long drive into the country. After the ride he seemed very much fatigued, and that night was seized with very great dyspnœa, increased violence of the coughing spells, and after a short time, with general convulsions. I saw him on the following day. He was breathing very rapidly and with much effort, there was a good deal of subcrepitant râle through the chest, the skin was cool, and about the mouth had a cyanotic tint, and he was unconscious. The same symptoms persisted through the day with occasional convulsive seizures, and on the following day he died. At the autopsy, there was found very extensive collapse of both lungs, as proved both by the anatomical appearances, and by inflation. There was no pneumonia, and very moderate bronchitis.

Bronchitis has always been supposed to be the most frequent complication of hooping-cough, and there can be no doubt that it is one of the most important. The recent discoveries of the existence and nature of collapse have shown, however, that many of the fatal cases, hitherto ascribed to bronchitis, or to bronchitis and pneumonia combined, must have been cases of collapse, so that large allowances must be made for all statistics collected before the discovery of the true nature of the last-named lesion.

There is, as has already been stated, a certain amount of pulmonary catarrh, in every case of hooping-cough. This is a normal element of the disease. To constitute a complication there must be a true bronchitis, an inflammation of the bronchial mucous membrane, sufficient to produce the ordinary symptoms of that disease. This exists in a great many cases; MM. Rilliet and Barthez found it to exist either alone or combined with pneumonia in half of the fatal cases. Of the 208 cases observed by myself, it existed to a greater or less extent in 42. In 28 of these it was mild or only moderately severe, and of these all but one recovered. In 14 it was severe and very extensive, or else capillary, and of these 6 died. Of the fatal cases, it was in several no doubt attended with collapse of the lung-tissue. In fatal cases it has often been found accompanied by continuous dilatation of the smaller bronchia.

Pneumonia, according to the authors above quoted, is about as frequent as bronchitis. When, however, the fatal termination took place soon after the beginning of the disease (18th, 26th, or 27th days), it was not generally present. After these periods, on the contrary, it was almost always observed. As these authors, however, include, under the title of lobular pneumonia, many cases of bronchitis with collapse, it is clear that a large number of their cases of supposed pneumonia, ought to have been ranged under the head of bronchitis. For my own part, I have met with only five well-marked cases of pneumonia. Two of these occurred in girls of seven and nine years old respectively, one in a girl between one and two years of age, a fourth in a boy between two and three years old, and a fifth in a boy in his ninth year. They all recovered. The degree of danger from this complication is in proportion to the earliness of the age at which the disease occurs, and to the extent of the inflammation.

Emphysema has been supposed by some to be a common result or accompaniment of the disease. This is denied, however, by others. I have never observed it myself, and as nearly all the children whom I have attended with pertussis continue under my charge, I should certainly have noticed it, were it of common occurrence.

Vomiting is a very frequent incident in pertussis, but ought not to be regarded as a complication, unless dependent on some disease of the digestive organs, or symptomatic of cerebral disease. Where it occurs in simple cases, or in those complicated with bronchitis or pneumonia, it has always seemed to me to be advantageous.

Tuberculosis is not infrequent, according to the French authorities, as a sequence of the disease. In the majority of the cases the tubercular deposit is concentrated in the lungs and bronchial ganglions. I am disposed to believe that it is of rare occurrence in this city, at least amongst the better classes, as I comparatively seldom meet with it, or indeed with any form of tubercular disease in children.

DIAGNOSIS.—The diagnosis of pertussis is difficult only during the first stage of the complaint. It is impossible, indeed, to distinguish during that stage, between it and simple mild laryngitis, or the mild catarrhal attacks which are so common in our climate. After it has once fairly entered upon the second stage, it is scarcely possible to confound it with any other malady. MM. Rilliet and Barthez state, however, that acute bronchitis with paroxysmal cough is not unfrequently mistaken for pertussis, and I recollect perfectly having made this mistake myself, in a little girl, five years of age. The cough assumed so exactly the features of pertussis, that after waiting a few days, I announced, authoritatively, the presence of pertussis. Only three or four days after this I was forced to take it all back, for the whole thing had disappeared, bronchitis, pertussis, and all. The patient was entirely well. But the mistake need seldom be made, if it be recollected that in acute bronchitis with paroxysmal cough, the invasion is sudden; that there is violent fever, great dyspnœa, and the physical signs of bronchitis; that the hoop is generally wanting, or feebly marked, and that the disease is violent and rapid in its course; all of which circumstances are widely different from what occurs in pertussis.

The same authors assert that tuberculosis of the bronchial ganglions gives rise to a cough which may be mistaken for pertussis. The following table extracted from their work will show the differences between the two disorders.

PERTUSSIS.	TUBERCULOSIS OF THE BRONCHIAL GANGLIONS.
Often epidemic, attacking several children at once; transmissible by contagion.	Always sporadic; non-contagious.
Three distinct stages, of which only the second accompanied by kinks.	No distinct stages.
Kinks attended with hooping, ropy expectoration, and vomiting.	Kinks generally very short, without hooping, ropy expectoration, or vomiting.
Pure respiration in the intervals between the kinks.	Physical signs of tuberculosis of the ganglions; but in certain cases, absence of these signs.
In the intervals between the kinks respiration and pulse natural, so long as the disease is simple.	Accessions of asthma in some cases, with the kinks; continuous febrile movement, with evening exacerbations; sweats; progressive emaciation, &c.
Voice natural.	Voice sometimes hoarse.
Course generally acute.	Chronic course.

PROGNOSIS.—Pertussis is rarely a dangerous or fatal disease so long as it remains simple. Of the 208 cases observed by myself, 148 were simple, all of which recovered. Nevertheless, even the simple disease does sometimes terminate fatally, from the excessive violence of the paroxysms of coughing.

The danger in hooping-cough, which is considerable, depends, therefore, almost entirely on the complications which are so apt to occur, for which reason the physician should watch with the closest attention in order to prevent their occurrence, and that he may recognise and treat them in their earliest stages. The most dangerous complication is convulsions, and after that bronchitis and pneumonia. So long as the child seems well and lively, and without fever or dyspnœa, in the intervals between the fits, there is nothing to be feared. But if, on the contrary, it becomes languid and irritable, with indisposition to take food, feverishness, and some increase of the rate of respiration, the practitioner should be upon his guard. A very early age and natural delicacy of constitution, are unfavorable circumstances in the disease. Some form of complication occurred in 65 of the 208 cases observed by myself. Of the 65, 12 died.

Five of the 12 fatal cases ended with convulsions. Of these 5 cases, the convulsions were caused by bronchitis and collapse of the lung in 4, the fatal result being the consequence, in fact, of the lung complication. One of the cases was independent, apparently, of disease of the lung (though, as no post-mortem examination was made, this cannot be asserted positively), but seemed to be the result of the violent laryngismus with contracture and general convulsions, such as will be described in the article on Laryngismus Stridulus. Two of the cases occurred in children of 8 and 9 months old respectively, and proved fatal in twenty-four hours after the setting-in of the convulsions. Two others occurred in children in their second year; and the fifth occurred in a boy between 3 and 4 years old, and caused death in seven hours.

Of the remaining 7 fatal cases, one was the result of collapse of the lungs, supervening suddenly upon a mild bronchitis, in a twin child between two and three months old. The second was caused by tubercular disease of the lungs, in a child between three and four years old, and the remaining five by bronchitis, associated, to a greater or less extent, in all probability, with collapse of the lung. Of the last-mentioned five cases, one occurred in a child between five and six months old, and was rapid in its course; two occurred in children between one and two years old, one being rapid and the other lingering in its course; one occurred in the third year of life, and was attended with severe diarrhœa from teething, as well as with bronchitis and collapse; and the fifth occurred in a child in its fourth year, and was slow and gradual in its course. To sum up, it may be stated that of the 12 fatal cases, 10 were the result of bronchitis and collapse, 1 of tuberculosis of the lungs, and 1 of laryngismus stridulus.

NATURE OF THE DISEASE.—There is no essential anatomical lesion in pertussis, except, perhaps, slight inflammation of the bronchial mucous membrane. In most of the cases, the membrane lining the larger and smaller air-tubes, and very rarely that of the trachea, is reddened and perceptibly thicker than natural, and the tubes contain a considerable quantity of frothy mucus, or a thick, viscid, and tenacious phlegm.

As to the nature of the disease, it seems to me very clear that it ought to be regarded as comprising two elements of morbid action, one of which consists in slight inflammation of the respiratory mucous membrane, and the other of disordered action of the respiratory system of excito-motory nerves. It is neither a pure neurosis nor a pure inflammation, but partakes of the characters of both, and much more of the former than of the latter. The authors of the *Compendium de Médecine Pratique* (t. ii, p. 526) regard it as a neurosis, on the following grounds: 1. "In the greater number of cases, the respiratory apparatus presents no kind of alteration, or else the lesions are so multiplied or variable that they are surely not the real origin of the disease; 2. The clearly remittent course of the symptoms and the total absence of fever, unless some complication is present, are not observed in ordinary or even specific inflammations; 3. The cessation or sudden return of the paroxysms under the influence of moral emotions or change of place, belong to a disorder of innervation and not to inflammation, which commonly passes through certain stages before it is resolved; 4. The complete return to health, the integrity of all the functions in slight cases, the resistance which it opposes to treatment, the uselessness of antiphlogistics, and the success obtained from narcotics and antispasmodics, are all so many circumstances peculiar to hooping-cough and to many of the neuroses."

Treatment of Simple Pertussis.—Hooping-cough, like all other diseases, varies greatly in its degree of severity. It is sometimes an affair of no consequence scarcely, the patient passing through its stages without suffering, and without any injurious consequences whatever to the general health. I have known a large family of children to pass through the disease without other treatment than attention to a prudent hygiene, and with no other medicine than a few doses of a mild cathartic, given to relieve some uncomfortable gastric symptoms. I have known one child in a family where the disease was prevailing at the time, to have the cough for only five weeks, and to hoop only on two or three occasions, and to lose neither appetite nor spirits for a moment. Such cases evidently need no interference, and a wise physician will, in such, order no drugs. His business will be simply to direct that the child be guarded against cold and against imprudences in diet.

In other instances the disease assumes, from a very early period, or sometimes not until later, a character of a very different kind. Without any complication whatever, the natural symptoms of the disease develop in great intensity. The spells of coughing are very frequent, very violent, and very long-continued. Instead of some twenty spells or less in twenty-four hours, as is the rule in mild and moderate cases, the patient will average two or more every hour, having fifty or sixty spells in the day. The laryngismus, instead of being slight will be violent and distressing, so that in lieu of three, four, or five hoops in a paroxysm, there may be fourteen or fifteen, and these so shrill, acute, and prolonged, as greatly to exhaust the poor little patient. Or the laryngismus may be so intense as to close for a few seconds the glottis, and arrest entirely the respiration, giving rise to the most painful attacks of struggling and suffocation possible to behold. Or the vomiting may be so frequent as seriously to interfere with the nutrition of the child, and thus cause threatening and even dangerous debility. In certain families, and in certain epidemic types of the disease, it assumes these severe features, and such cases must take the same rank in this disease, that grave cases of scarlet fever, measles, or variola, take in those affections.

Cases of this latter kind imperatively demand treatment, and they are, I am happy to state, susceptible very generally of great and striking alleviation, by the use of proper means,—means, too, which in themselves are very safe. In two instances of this kind, which have come into my hands after having been under the infinitesimal treatment, I have had great satisfaction in witnessing the beneficial effects of positive medical action,—effects, which seemed as clear to my comprehension as any I have seen from the visible action of surgical treatment in surgical diseases.

At one time I was very much disposed, I confess, to avoid all interference so long as I saw no complication in the case, under the supposition that the disease in its simple form was always safe, and might be trusted to the efforts of nature. More enlarged experience has taught me, however, that the very violence of the disease, even in its simple form, was a source of danger; and that, moreover, such were much more liable than milder ones to complications, while a proper treatment, instituted so soon as the disease began to show these severe characters, has almost always, after a few days' perseverance, brought about and maintained a most evident amelioration of the symptoms, thus keeping within due bounds a development which might otherwise have gone on to a disastrous termination.

Bloodletting.—Depletion is very rarely necessary in simple pertussis. The only cases in which it can be called for are those occurring in sanguine children, where the paroxysms are so violent as to endanger the brain by over-distension of the vessels. In these cases a small bleeding, or the application of a few leeches to the temples or behind the ears, may be proper; but even these may often be safely treated by reduced diet and by a few doses of saline cathartics, without a resort to the more powerful and more permanently exhausting means of depletion. As for the treatment of simple pertussis by repeated venesections, in the hope of curtailing its duration, or under the idea of their being rendered necessary by the violence of the malady, it seems to me forbidden by the present state of medical knowledge, which informs us that the greater number of the cases do not endanger life so long as they remain simple, however violent they appear to be. Of the 143 simple cases treated by myself, depletion was not used in any, and all recovered.

Antispasmodics.—Of the different remedies of this class which have been used in the disease, I shall only mention assafœtida, which is recommended upon very high authority, and is doubtless useful in moderating the severity of the paroxysms. It is much employed in this city as a domestic remedy. I have used it myself on several occasions with decided benefit, but, as I have obtained better and more constant success from other means, I do not very often resort to it. Dewees speaks of it as "occasionally useful, but never decidedly efficacious" in his hands. Kopp recommends it very strongly, in the dose of six grains three times a day in pill, for a child four years old. This seems to me a large dose. I have generally given two or three grains three or four times a day to a child of that age.

Narcotics.—Of the various narcotics which have been more or less extensively employed, the most important are belladonna, opium, and hydrocyanic acid. *Belladonna* is highly recommended by several German authors, by MM. Rilliet and Barthez, who state that it is beyond contradiction the one most deserving of confidence, by MM. Trousseau and Pidoux, and by Dr. Eberle. It ought to be given with care, and not continued for too long a time. Eberle says that it ought not to be exhibited where there is fever and bronchial inflammation. MM. Trousseau and Pidoux employ the following formula: ℞.—Pulv. Belladonnæ, gr. iv; Extract. Opii Aquos., gr. iv; Extract. Valerianæ, ʒss. Ft. in pilul. no. xvi. Give from one to four in the course of the day. If the child dislike the pilular form, they give it in syrup, according to the following formula: ℞.—Extract. Belladonnæ, gr. iv; Syrup. Opii, Syrup. Flor. Aurantii, āā ʒj. Misce. Of this, from one to eight teaspoonfuls are to be given in twenty-four hours.

Dr. Sam. Jackson, of Northumberland (*Am. Journ. Med. Sc.*, August, 1834), recommends this remedy in the very highest terms, and regards it as exerting a most powerful controlling influence over the disease. Dr. H. Corson, of Montgomery County, Pa. (*Loc. cit.*, Oct., 1852), also gives very strong testimony in favor of its efficacy in the disease. Dr. Corson says: "During the last seventeen years, I have given the extract of belladonna to hundreds of patients, from two months to fifty years of age, and am firmly convinced that it has a greater control over hooping-cough than any other remedy in common use, and that, while in a few cases the system did not seem susceptible to its action, in the doses I have prescribed, yet, in nearly all, the disease yielded quickly." He asserts that he has cured the disease, effectually and permanently, in numerous instances, in from five days to a week, and generally within two weeks, with this remedy, while in others it failed entirely. In children under one year old, he begins with one-sixteenth or one-eighth of a grain as the dose, to be repeated every two hours, and to be increased a little every day, until the proper dose is reached. The doses are repeated, and if necessary increased, until the pupils are dilated, the face flushed, the mouth dry, and the vision confused. His mode of prescribing it is to dissolve eight grains of the extract in one ounce of water. Nine drops of this contain just one-eighth of a grain of the remedy. Since the last edition of this work, I have used the belladonna more frequently and with greater perseverance than ever before, and am happy to state that I have had greater reason to be pleased with it. I have *never* seen it cut short the disease within a week, as Dr. Corson has, though I have given it in a number of cases in which it has dilated the pupils and reddened the skin, yet, that it will, in a good many cases, assist to moderate the laryngismus, shorten the paroxysms, and diminish their number after it has been used for several days, I have no doubt. In some instances, it, like all remedies, in all diseases, entirely fails to produce any effect. I generally give it in connection with some other remedy, and usually with alum or carbonate of potash. The dose I employ is from the twelfth to the twenty-fourth part of a grain every four hours.

Opium is confessedly a very valuable remedy in the disease, not as a curative, but as a sedative and palliative. When the cough is frequent and fatiguing, especially if the patient have an irritable and nervous constitution, some opiate preparation is of the utmost service in moderating the frequency and violence of the paroxysms, and in allaying irritability and restlessness. It is best given in the evening, and in combination with ipecacuanha, or with very minute doses of antimony.

Hydrocyanic acid has been employed by various observers, and is highly spoken of by some. Its poisonous properties, however, have deterred many, and amongst them, myself, from resorting to it. Inasmuch as there are other and safer means for conducting the disease to a favorable termination, it seems to me useless to venture upon so potent a preparation as this. Dr. Atlee, of Lancaster, gave it in the following formula: ℞.—Acid. Hydrocyan., ♏j; Syrup. Simpl. ℥j.—M. A teaspoonful to be given morning and evening, and if no uneasiness, dizziness, or sickness be produced within forty-eight hours, the dose to be repeated three times a day. This prescription is for a child six months old; one drop of the acid being added for each year of the child's age beyond one year. He has never repeated the dose more than four times a day. (*Condie's Dis. of Child.*, 2d ed., p. 337.)

Emetics and *Nauseants* are amongst the most important remedies in the treatment of hooping-cough, since they exert a powerful influence upon the disease, and unless carried to excess, are not in themselves likely to be injurious. Some authors recommend the administration of an emetic every day or every other day, while others give them according to the necessity of the case. Believing that frequently repeated emetic doses are unnecessarily severe, and productive of too much fatigue and exhaustion, I have preferred in the simple disease to give only small doses of ipecacuanha from time to time, so as to moderate the violence of the cough. Tartar emetic is seldom necessary, and ought to be avoided if possible, on account of its disposition to irritate and inflame the gastro-intestinal mucous membrane, and because of its exhausting effects on the general economy. The syrup of ipecacuanha is the preparation I have almost always used. From ten to twenty drops, given three times a day to a child three years old, will very generally moderate the severity of the paroxysms.

Purgatives are necessary in the simple disease only when constipation is present. The mildest ought to be preferred, in order to avoid irritation and exhaustion. Castor oil, magnesia, or syrup of rhubarb are the best.

Particular Remedies.—Of the different specific remedies that have been employed, none have attained and maintained so high a reputation in this city as the *carbonate of potassa*, which, in the form of the cochineal mixture, is constantly used both by physicians and as a domestic remedy. The following formula is the one generally administered: ℞.—Potass. Carbonat., ℈j; Cocci, ℈ss; Sacch. alb., ʒj; Aquæ fontis, ℥iv.—M. Give a dessert-spoonful three times a day to a child a year old. Believing the carbonate of potash to be the active agent in the mixture, I have generally left out the cochineal and used the potash alone, dissolving it in equal parts of syrup of gum and water. I have frequently employed this remedy, and believe that it, with alum and belladonna, are the most useful agents we have to keep down the violence of the disease. I have given it in the dose of a grain three or four times in the twenty-four hours, to children one and two years old, for several weeks at a time, without witnessing any injurious effects from it.

Alum is highly recommended as a remedy in pertussis by Dr. Golding Bird (*Guy's Hospital Reports*, April, 1845). He states that in the second or nervous period of the disease, when "all inflammatory symptoms have subsided, and when, with a cool skin and clean tongue, the little patient is harassed by a copious secretion from the bronchi, the attempt to get rid of which produces the exhausting and characteristic cough, alum will be found to be of much value." He adds that he "has not yet met with any other remedy which has acted so satisfactorily, or afforded such marked and rapid relief." From reading Dr. Bird's remarks on alum, and prompted by my knowledge of its admirable qualities in the treatment of croup, I was led to make trial of it in the disease under consideration, and I believe I may say that it has exerted a more decided influence in moderating the violence of the disorder, than any that I have ever made use of. I have administered it in 139 cases, beginning in the course of the second stage. In nearly all it was beneficial, and in some the effects were strikingly useful, the improvement being more rapid than I had ever seen to result from other remedies, or to occur when the disease has been allowed to pursue its natural course. In a boy between five and six years of age, who had been coughing violently for two weeks, the paroxysms diminished so much in intensity and frequency after he had taken the remedy two days, that he was not once disturbed at night (though before he had always been waked several times), and the spells which occurred during the day were much less severe. After continuing the remedy for ten days, the disease had subsided so much that its employment was suspended. Soon after, however, the paroxysms again became severe and troublesome. The alum was resumed, and with the same results as at first. In another family in which there were three children, all of whom had been taking syrup of ipecacuanha and carbonate of potash for some days, without any good effects, the alum was given and acted as in the case first referred to. The nights were comparatively quiet, and the spells occurring through the day very much moderated. I may repeat that, so far as my experience in the above 139 cases goes, the effects of alum have been more decided and satisfactory than those of any other remedy. I have never known it to produce ill consequences either at the time of its administration or subsequently, though I have given it to children from two months to seven years of age, and have continued its use from one to six weeks at a time. It, like all other remedies, sometimes fails, however, to do any good, and when I have found this to be the case, I have substituted belladonna or carbonate of potash, either alone or combined, and it is curious to observe how, in some instances, the latter remedies will succeed where the other fails. Nothing but a trial will show, which is the most proper in any individual case. On some occasions I have given the alum and belladonna together, or alternately, and have been much pleased with the results. If administered in large doses alum produces vomiting. It does not constipate, but on the contrary, is apt to induce diarrhœa, when continued for some time. Dr. Bird gives from two to six grains every four hours. His formula is as follows:

℞.—Aluminis, ... gr. xxv.
Ext. Conii, ... gr. xii.
Syrup. Rhœados, ... ʒij.
Aquæ Anethi, ... ℥iii.—M.
Give a medium-sized spoonful every three hours.

To children under one year I give from half a grain to a grain, three or four times a day; and to those over that age, two grains every four or six hours. The formula I have employed is the following:

℞.—Aluminis, ... ℈iss.
Syrup. Zingib., Syrup. Acaciæ, Aquæ Fontis, āā ℥i.—M.

When this is prepared with good syrups, it tastes very much like lemonade, and is not at all unpleasant, so that children take it without difficulty. The dose is a teaspoonful three times a day, or every four or six hours.

Sulphur.—Some of the German authorities make frequent use of, and greatly commend the effects of flowers of sulphur, both at the beginning and throughout the course of the disease. MM. Rilliet and Barthez state that they saw it succeed several times in the hands of M. Jadelot. I have never employed it. It is given in doses of three grains two or three times a day, to children from two to four years of age; and, to those who are older, in doses of fifteen grains or more in the twenty-four hours. It may be administered in powder diffused in milk or syrup, or in emulsion. It is said not to be purgative in the doses mentioned.

Various other remedies have been recommended by different authors, the most important of which are the *subcarbonate of iron* used by Dr. Steyman, and by Lombard of Geneva; the *misletoe* (Viscum album), employed by Baglivi and J. Frank, and recently by MM. Guersent and Blache; who give it in powder, in the dose of twelve or fourteen grains four times a day; and the *cicuta*, which is highly spoken of by several German authors.

Revulsives.—The milder revulsives are useful in certain complications of pertussis, and as palliatives. To make them the chief basis of the treatment, however, which has been done by some, is a mistake. In order to produce a decided impression upon the disease, it would be necessary to resort to the more powerful remedies of the class, such as moxas, issues, tartar emetic ointment, blisters, &c., the use of which is not warranted by the nature of the disorder.

Tonics.—In a number of cases that have come under my notice, the patient has grown pale and weak in the course of the disease, and this without any local complication, but from the disturbance of the digestive system that often exists to a greater or less extent, from the great frequency of the vomiting which prevents them from taking a sufficient amount of nutriment, and from the exhausting effect of the violent muscular exertion undergone during the paroxysms. In such instances, when there has been no fever, or merely a little evening febricula, I have employed tonics with much advantage, and never to the injury of the patient. I have generally made use of the Huxham's tincture, either alone, in doses of from ten to twenty drops three times a day, or in connection with the syrup of the iodide of iron, or half a grain of the metallic iron (Pulv. Ferri). When the appetite has been very feeble, I have found that quinine, in the dose of a grain three or four times a day, at the age of three or four years, has restored it more rapidly than any remedy I have made use of.

Before concluding my remarks upon the treatment of simple hooping-cough, I wish to state that cases of the disease occur not unfrequently of so mild a form, as to need absolutely no treatment other than the proper degree of attention to hygiene; and that others again, more numerous than those just mentioned, will be met with, in which the only treatment necessary is the use, for a few days or weeks, of some mild expectorant and opiate at night to lessen the severity of the paroxysms, or of moderate doses of alum, belladonna, or carbonate of potash.

In infants particularly it is proper to give as little medicine as possible, allowing the disease to go on without interference so long as it progresses safely. In a good many mild cases, small doses of paregoric and syrup of ipecacuanha, constitute the only remedies I have found necessary in the cases of infants. When, however, the paroxysms become numerous and violent, exhausting the strength of the child and distressing its nervous system, we must make use of some remedy to allay the severity of the attacks. I have found the alum safe and effectual. At the age of two and three months, I have usually given from half a grain to a grain three times a day, taking care to suspend it for a day or two when it caused troublesome vomiting or purging, and then resuming it in diminished dose. Or I have made use of a quarter or half a grain of carbonate of potash, or of the twenty-fourth part of a grain of the extract of belladonna three or four times a day.

TREATMENT OF THE COMPLICATIONS.—If any of the diseases which have been mentioned as apt to occur during pertussis should arise, the treatment which is proper for them in their idiopathic form must be adopted without regard to the hooping-cough, with the following reservations: that care must be taken not to use means of too powerful and exhausting a nature, or such as have a tendency to irritate the organs with which they come in contact. For, it must be recollected, that after the complication is cured, the patient has still the original disease to go through with, and therefore requires all his strength; and, moreover, the various organs of the body are predisposed, by the very fact of the existence of the original malady, to assume diseased action, should any irritation in the shape of a violent remedy be applied to them.

The cases of *bronchitis* which came under my observation were treated in the simplest manner. The children were put to bed, the diet carefully regulated, the bowels gently opened with castor oil or syrup of rhubarb, and small doses of syrup of ipecacuanha or antimonial wine, with sweet spirits of nitre, were administered every two hours. Mustard poultices were applied once or twice a day to the interscapular space, and mustard foot-baths used every night, or more frequently, if the dyspnœa were considerable. If the bronchial secretions were very profuse, and the cough troublesome, the decoction or syrup of seneka was given in connection with occasional doses of laudanum or paregoric.

The treatment of collapse should be that which is recommended in the article on collapse, modified, of course, as may be rendered necessary, by the existence of the hooping-cough. A mild emetic, if the patient seem strong enough to bear one; counter-irritants, and especially sinapisms or mustard poultices applied to the chest, nutritious food, and mild stimulants, as brandy, wine-whey, tincture of bark, quinine, or aromatic spirits of ammonia, must form the principal means of treatment.

The complication of *pneumonia* was treated somewhat differently. In four of the cases, occurring in children seven and nine years and between two and three years old respectively, depletion was used: the eldest was bled at the arm and the other three leeched upon the chest. In the fourth case, in a child between one and two years old, the treatment consisted in the use of tartar emetic, in the dose of the sixtieth of a grain every hour, for the first three days, and afterwards of syrup of ipecacuanha, spirits of Mindererus, and paregoric combined. In the three cases first mentioned, the treatment besides the depletion consisted in the administration of small doses of antimonial wine and nitre, in the manner pointed out in the article on pneumonia, in the use of small doses of Dover's powder, and of the foot-bath. They all recovered.

When *convulsions* occur they must be treated according to the cause which produces them, and the constitution and present state of the child. If the patient be strong and sanguine, and not exhausted by previous sickness, the treatment should consist of depletion by venesection, or by leeches to the temples, or behind the ears; of cold applications to the head; the warm bath; cathartics or purgative enemata; and revulsives in the form of sinapisms, or of a small blister to the nucha. If, on the contrary, the patient is of delicate constitution, or exhausted by long illness, and especially when they are the result of extensive collapse of the lungs, occurring spontaneously or supervening upon bronchitis, we must be content to resort to warm baths, revulsives, antispasmodics and anodynes, stimuli, and stimulating enemata.

Of the 12 cases of convulsions that came under my notice, 5 proved fatal. Two of the fatal cases occurred in children who had long been laboring under bronchitis, probably associated with collapse, that had baffled all treatment. Death took place within twenty-four hours from the appearance of the convulsions, which were in fact the result of the diseased condition of the lungs. No treatment further than the warm bath and sinapisms, was resorted to. In the third case, the convulsions came on in the seventh week of the disease, in a child who had been laboring for a number of days under severe bronchitis; they ended fatally in seven hours. The treatment employed at the beginning of the fit was a warm bath, an enema, and mustard plasters. After a few hours, solution of morphia with fluid extract of valerian were given by enema, cold was applied to the head, and a blister to the nucha. In the fourth case, which occurred in a child in the second year of its life, they were caused by bronchitis and collapse, and proved fatal in two days. The treatment consisted in the use of warm baths, counter-irritants, alum, and small doses of brandy. The fifth case likewise occurred in the second year. This was one in which all the symptoms of laryngismus stridulus were added to those of the primary disease,—prolonged laryngismus, contracture, and general convulsions. It was treated with belladonna, opium, assafœtida, and warm baths, but all to no effect.

Of the favorable cases, one occurred in a boy five months of age, on the third day of a severe attack of bronchitis. The child was immediately placed in a warm bath, and large sinapisms applied over the front of the chest and upon the extremities, when the convulsions ceased. After this he was treated with half-grain doses of alum, repeated every three or four hours, mustard foot-baths and poultices, and small doses of wine of opium. On the sixth day of the attack, the third after the convulsive seizure, there having been no return of the convulsions, the bronchitis subsided with copious sweats and cold hands and feet, for which small quantities of brandy and water and wine-whey were used. The recovery was perfect. A second case occurred in a hearty boy nine months old, and seemed to depend on congestion of the brain, brought on by a severe fit of coughing. In this instance a venesection to a small amount was performed, the child was placed in a warm bath, and cold applied to the head. No return of the spasms took place, and the child recovered without difficulty. In another case the convulsion was caused by an attack of fever depending on dentition, and was treated by lancing the gums, by a warm foot-bath, and by the administration of a grain of calomel in a teaspoonful of castor oil. In a fourth case the convulsions were caused by pneumonia, and were managed by treating the pneumonia, except that at the moment of the attack a warm bath and a stimulating enema were made use of. In a fifth the convulsion, which was a short one, occurred at the onset of an attack of bronchitis. No particular treatment beyond what was necessary for that disease was required. In a sixth, in a boy nine months old, the convulsion occurred suddenly, was violent, and lasted fifteen minutes. The cause could not be ascertained. The only treatment used for the convulsion was a warm bath. There was no return. In a seventh case, in a boy nine months old, a slight convulsion occurred during one of the paroxysms in the fifth week. No treatment was necessary, as the attack was very short, and there was no recurrence of the symptoms.

HYGIENIC TREATMENT.—This part of the management of the disease is of the highest importance, for it is by careful attention to its details, that the complications which constitute the chief danger of the malady are to be prevented. In a considerable number of cases of pertussis, nothing more need be done than to insist upon strict attention to hygienic rules. The chief indications are, to preserve the child from taking cold, and to prevent indiscretions in diet. The clothing ought to be warm, and during the autumn, winter, and spring, flannel should always be placed next to the skin. The child ought to be kept in the house during damp weather at all seasons, and whenever, during the winter season, it is intensely cold. The diet should be nutritious, but of easy digestion. All heavy, rich food ought to be absolutely forbidden during the continuance of the malady.

TREATMENT OF THE PAROXYSM.—It often happens that the paroxysms are so violent, that the child seems to be in imminent danger of suffocation or of convulsions. This is especially true of infants. In six cases that I have seen, in infants under six months old, the kinks lasted so long, and the spasm of the larynx was so unyielding, that the children struggled as though laboring under tetanus; the countenance was disturbed and anxious; the face and hands, at first flushed, became purple from deep congestion; and on some occasions the breathing was suspended for several seconds, so that life *seemed* for the time in the greatest danger. The difficulty in these cases depends on the spasmodic closure of the glottis, which is, sometimes, no doubt, completely shut. I have never known these alarming symptoms of asphyxia to occur when the hoop has been clear and distinct, for when that is present, the larynx cannot be very tightly closed.

When the symptoms above described occur in a child several years of age, the patient should be raised and supported in the sitting posture; when in an infant, the child ought to be held lightly in the arms, so that it may take any position which instinct prompts it to. At the same time cold water ought to be sprinkled from the fingers upon the face, the child should be gently fanned, or, if the weather be warm, taken to the open window, and if there be time, it is well to put the feet into mustard water. It has been recommended on such occasions to apply compresses dipped into cold water to the sternum. I would propose the trial of a means which my father found very successful in arresting tonic spasm of the respiratory muscles, in a case of laryngismus stridulus. This is the sudden application of a piece of ice wrapped in linen to the epigastrium. When the laryngeal spasm is very intense and obstinate, a small blister to the front of the neck, is useful in controlling it.

CLASS II.

DISEASES OF THE DIGESTIVE ORGANS.

CHAPTER I.

DISEASES OF THE MOUTH.

I FIND myself much embarrassed as to what classification of the diseases of the mouth is the most proper to adopt. So much confusion reigns amongst authors as to the nature of these affections, and consequently as to their nomenclature, that it is very difficult to reconcile the various discrepancies which exist. After much consideration, however, I believe that the following arrangement is the one best suited to the existing state of knowledge upon these affections:

1. Simple or erythematous stomatitis.
2. Follicular stomatitis, or aphthæ.
3. Ulcerative, or ulcero-membranous stomatitis.
4. Gangrene of the mouth.
5. Thrush, or stomatitis with curd-like exudation.

ARTICLE I.

SIMPLE OR ERYTHEMATOUS STOMATITIS.

THIS form of stomatitis consists of simple diffuse inflammation of the mucous membrane of the mouth, unattended by vesicular or pustular productions, by ulceration, or by membranous exudation. It is a disease of infrequent occurrence, except in the forming stage of other kinds of stomatitis, and of little importance, seldom requiring the attention of the physician.

The *causes* of the disease are the introduction of irritating substances, such as hot drinks, and acrid or caustic preparations, into the mouth; difficult dentition; and probably sympathy with disordered states of the stomach.

It occurs not unfrequently as a secondary affection, particularly in the course of measles, scarlet fever, and small-pox.

The *symptoms* of erythematous stomatitis are more or less vivid redness of the mucous membrane, sometimes diffused, and at others punctuated or disposed in patches; slight swelling of the same tissue; heat; and tenderness to the touch, and also in the act of sucking or eating. The child is generally fretful and restless, and either loses its appetite, or refuses to nurse or take food freely, on account of the tenderness of the mouth. There are seldom any general symptoms except in secondary cases, in which they are those of the primary affection.

The *treatment* is very simple. It consists in the use of some demulcent wash, as gum-water, sassafras pith mucilage, a little honey put on the tongue occasionally, and if the inflammation be at all considerable, in the application of some astringent preparation. This may consist of honey and borax, two or three parts of the former to one of the latter, or of the following wash, recommended by M. Bouchut:

℞.—Mel. Rosæ, ...	℥i.
Aluminis, ...	ʒss.
Aquæ distillat., ...	℥ss.—M.

The application of any of the washes recommended is best made by means of a thick and soft camel's-hair pencil; or it may be done with a soft rag, which should be dipped in the wash, and then conveyed into the mouth on the point of the finger. The remedy ought to be used several times a day.

If signs of gastric or intestinal disorder are present, they should be attended to.

ARTICLE II.

APHTHÆ.

DEFINITION; SYNONYMES; FREQUENCY; FORMS.—The term aphthæ ought to be restricted to the vesicular and ulcerous form of disease of the buccal mucous membrane, in which that tissue is covered with an eruption of vesicles which break, and are followed by small rounded ulcerations. Under this title writers formerly confounded the affection we are now considering with ulcerative stomatitis and thrush. It is called by Billard follicular stomatitis, and by several other writers vesicular stomatitis.

The *frequency* of the disease is very considerable. I shall describe two *forms*, the *discrete* and *confluent*.

CAUSES.—The only causes which seem to have been ascertained with any degree of certainty are early age and the process of dentition; the contact of irritating substances, particularly stimulating and acrid articles of food, with the mucous membrane of the mouth; and the existence of some morbid irritation of the digestive tube, especially of the stomach. The confluent form is often connected with severe general disease of the constitution.

Symptoms; Duration.—Aphthæ begin in the form of small red elevations, having little white points upon their centres, which consist of the epithelium of the mucous membrane raised into vesicles. The vesicles are small in size, oval or roundish in shape, and of a white or pearl color. They soon break and allow the fluid which they contained to escape, after which there remains a little rounded ulcer, with excavated and more or less thickened edges, and surrounded almost always by a red circle of inflammation. The bottom of the ulcers is usually of a grayish color. There is seldom any diffuse inflammation of the mucous membrane in this disease. The *number* of aphthæ varies in the two forms. In the discrete variety there are but few, whilst in the confluent form they are of course much more numerous. They generally appear first on the internal surfaces of the lips and gums, and then on the inside of the cheeks, edges of the tongue, and soft palate.

The discrete form is generally accompanied by symptoms of slight disorder of the digestive organs, consisting of thirst, acid eructations or vomiting, imperfect digestion, and a little constipation or diarrhœa. The confluent form, which is much more rare, especially in very young infants, usually coincides, as has already been stated, with severe general or local disease.

The *duration* of aphthæ is different in the two varieties of the affection. The discrete form generally pursues a rapid progress, lasting, usually, from the beginning to the time of cicatrization, between four and seven days. Sometimes, however, when the vesicles are formed successively, one after the other, the disease lasts much longer. The confluent variety pursues a much slower progress, and is much more difficult of cure.

Diagnosis and Prognosis.—The diagnosis of discrete aphthæ is not at all difficult, in consequence of their being isolated and succeeded by small and limited ulcerations. The confluent form, on the contrary, may be confounded with ulcerative or ulcero-membranous stomatitis, and with thrush. From the first-mentioned disease it may be distinguished, however, by attention to the circumstances that that affection begins by small white patches, and not by pustules, as do aphthæ; that the ulcerations which follow the patches are covered with true pseudo-membrane; and that the white patches just spoken of appear first upon the gums, whilst aphthæ generally begin upon the posterior surface of the inferior lip, and upon the tongue. From thrush it is to be distinguished by the facts that that disease commences by white points, which are not pustular, and which, running together, form a creamy exudation, and by the absence or very small number of ulcerations.

Discrete aphthæ constitute a very mild disorder. They always recover without much difficulty. The confluent disease is more serious, because its progress is much slower, its cure more difficult, and because it is often connected, as has been stated, with some other severe disease.

TREATMENT.—Aphthæ, particularly the discrete variety, require in general very simple treatment. The means to be employed are *general* and *topical*.

The *discrete variety* usually requires only topical remedies, regulation of the diet, and when there are marked symptoms of gastric derangement, the exhibition of some mild emetic, or of a laxative dose. The *local treatment* should consist of applications of demulcent preparations, as the mucilages of slippery elm, sassafras pith, flaxseed, marsh-mallow root, quince seeds, &c., which are to be used pure when there is no pain, or with the addition of a few drops of laudanum or wine of opium, when the mouth is sore and tender; the aphthæ ought to be touched occasionally with the mixture of borax and honey, or the aluminous preparation recommended for simple stomatitis. The applications must be made several times a day with a camel's-hair pencil, a pencil made of charpie or cotton, or with a soft rag covering the finger. When the ulcers which follow the vesicles fail to cicatrize rapidly under the above applications, or when they are numerous and painful, their cure may be very much hastened and the pain quickly relieved, by touching them lightly with a stick of nitrate of silver, or a piece of alum, sharpened to a point; or we may employ a pencil dipped into a strong solution of nitrate of silver, or into a mixture of one part of muriatic acid to two of honey.

The *general treatment* of discrete aphthæ need consist of nothing more than the prescription of a simple, unirritating diet in most of the cases. If, however, the digestive apparatus is deranged, the case must be treated according to the symptoms; by antacids or a gentle emetic, when the tongue is foul and the secretions acid, and by the use of a mild laxative, as castor oil, magnesia, or rhubarb, when there is constipation. When diarrhœa is present, we should resort first to a small dose of castor oil or syrup of rhubarb, with the addition of half a drop to two drops of laudanum, according to the age of the child, and afterwards to astringents and opiates, as will be recommended in the article on simple diarrhœa.

The treatment of *confluent aphthæ* must depend on their cause. The local treatment is the same as that for the discrete variety, except that cauterization should be resorted to at an earlier period. When they seem to depend upon a general morbid condition of the constitution, as congenital debility, a scorbutic diathesis, or upon chronic affections of the digestive organs, they must be treated in the first place by properly regulated and nutritious diet, and by the exhibition of tonics and gentle stimulants, particularly iron, quinine, and small quantities of very fine old brandy; and in the second case, in the manner which will be recommended for chronic derangements of the stomach and bowels, when I come to treat of the diseases of those organs.

ARTICLE III.

ULCERATIVE OR ULCERO-MEMBRANOUS STOMATITIS.

Definition; Synonymes; Frequency.—This form of sore mouth is characterized by a secretion upon the mucous membrane of a plastic exudation in thick, yellowish, adherent patches, and by inflammation, erosion, or ulceration of the subjacent tissues. It is the same disease as the aphtha gangrenosa, and I believe the cancrum oris also of Underwood; the ulceration of the mouth of Dewees and Eberle; the stomatite couenneuse, and the ulcerative and pseudo-membranous forms of the stomatite gangreneuse of M. Valleix; the stomatite pseudo-membraneuse or diphtheritique of some writers; and the stomatite ulcero-membraneuse of MM. Rilliet and Barthez. It is the disease described under the title of gangrenous sore mouth by Dr. B. H. Coates (*North American Surgical and Medical Journal*, vol. ii, 1826), with the exception of a few cases which were what I shall treat of as gangrene of the mouth. It is treated of by Dr. Condie (*Dis. of Chil.*, 2d edit., p. 142), under the title of gangrene of the mouth, and partly confounded, as it seems to me, with a much less frequent and vastly more dangerous disease, which I shall describe hereafter as a separate affection under that name.

Of the different titles given above, I prefer that of ulcero-membranous stomatitis, as most expressive of the distinctive features of the disease. This form of stomatitis is not very *frequent* in private practice, but sometimes prevails extensively in hospitals, and other public institutions for children, where it often assumes an epidemic character.

Causes.—The *predisposing causes* are epidemic influence, of the existence of which I believe there is no doubt; according to some observers, contagion, which, however, has not as yet been positively shown; and bad hygienic conditions as to cleanliness, ventilation, food, clothing, and habitation. That it is epidemic, I have no doubt from my own experience, since I am rarely called to a case without soon meeting with others, while I sometimes pass several months without seeing a single example of the disease. I have also known it to be epidemic in a household, having on one occasion met with seven cases in two families of children residing under one roof, on two other occasions with three cases, and on several others with two. It is most frequent between the ages of five and ten years, though it may attack all ages, and is more common in boys than girls. It occurs during the convalescence from severe diseases, as pneumonia, the eruptive fevers, typhoid fever, entero-colitis, and other affections of children.

The *exciting causes* of sporadic cases are unknown, with the exception, perhaps, of the presence of a carious tooth in the mouth, and fracture or necrosis of the maxillary bones.

SYMPTOMS; COURSE; DURATION.—The disease begins with slight pain and uneasy sensations in the gums, which then become swelled, red, bleeding when touched, and are soon after covered with a grayish, pultaceous exudation of varying thickness. The exudation extends from the gums to the internal surface of the lips and cheeks, and sometimes, but more rarely, to the soft palate, and even to the pharynx and nasal passages. The plastic deposit occurs in the form of small, and slightly projecting, yellowish patches, which approach each other, unite, and form bands of pseudo-membrane, somewhat uneven upon the surface, and adhering with considerable force to the tissue beneath. When the exudation is detached, the mucous membrane is found to be of a red or purple color, bleeding, and excoriated or ulcerated. The ulcerations which exist under the false membrane are of various depths, of a grayish, livid, or blackish color, with swelled, softened, and livid red, or bleeding edges. Those which are formed upon the inside of the lips are rounded in shape, whilst those seated in the angle between the lips and gums, are usually elongated. In mild cases of this affection, and these are particularly apt to occur in private practice amongst the easy classes of society, the local symptoms, though perfectly characteristic, are less severe than those just now described. The ulcerations are often few in number, amounting to four, five, or six upon the tongue, to a few scattered over the inner surfaces of the lips, and to some upon the gums, and especially about the necks of the teeth. The other symptoms are the same as those above mentioned, with the exception that they are milder in degree.

When the disease is mild, and when it is properly treated, the false membranes become detached, leaving the mucous tissue merely excoriated, in which case it soon regains its natural condition; or else the ulcers which exist beneath rapidly become healthy and cicatrize. In violent cases and in those badly treated, the inflammation, on the contrary, persists; the pseudo-membranes increase in thickness, or if detached, are formed anew; the ulcerations become deeper; the disease extends; and the case lasts an indefinite period of time.

Other symptoms, beside those we have mentioned, characterize the disease.

The *breath* is always more or less fetid, and in bad cases, almost gangrenous. The *salivary* and *submaxillary* glands are generally more or less swelled, hard, and painful, and according to some authors, the surrounding cellular tissue is in the same condition, though this is denied by others. The *movements* of the lower jaw are stiff and painful in severe cases. *Deglutition* is not affected unless the disease extends to the pharynx. In violent cases there is usually a copious *discharge* of bloody serum, which flows from the mouth during sleep. When the ulcerations are deep and large, the tissues beneath are more or less swelled; the swelling, however, rarely assumes the hard, resisting, circumscribed characters, with the tense, smooth, hot, and shining appearance of the skin, which exists in true gangrene of the mouth. In most of the cases there is a moderate, but decided *febrile reaction*, especially at the invasion. This usually subsides or disappears after two or three days, though it sometimes increases if the disease becomes extensive.

The disease begins, as already stated, on the gums, and unless limited to these parts, as sometimes happens, extends to the lips and cheeks. In many of the cases it attacks only one side of the mouth, and this is more frequently the left than the right.

The *course* of the disease is usually rapid in epidemic cases, and in those which are properly treated. Where badly treated, on the contrary, it may last from one to several months, or terminate in gangrene of the mouth.

DIAGNOSIS; PROGNOSIS.—The *diagnosis* is, as a general rule, very easy, if proper attention be paid to the characteristic features of the disease. It has, as already stated, been very often confounded with gangrene of the mouth. The method of distinguishing between the two will be given in full in the article on that disease. From thrush it is to be distinguished in the manner which will be pointed out when that disease comes under consideration.

The *prognosis* is favorable in the great majority of the cases. Sporadic cases probably always terminate favorably. The epidemic disease, though rarely fatal, sometimes proves so from its extension to the pharynx and larynx, or from its termination in gangrene of the mouth. I have seen a large number of cases in private practice, and have never as yet known one to become gangrenous or to prove fatal. Of upwards of 120 cases of this kind, observed by Dr. Coates at the Philadelphia Children's Asylum, in a period of three months, all but one recovered (*Loc. cit.*, p. 21). The cases which occur in the course of other diseases are not dangerous in themselves, but are so as being the sign of a great severity of the primary affection.

TREATMENT.—The treatment may be divided into *general*, and *local* or *topical*. The *general treatment* should consist in most of the cases in attention to the diet, which ought, in healthy and vigorous children, to be simple and unirritating, and in those who are weak and debilitated, nutritious and digestible. If the bowels are costive, or the child feverish and uncomfortable, a laxative dose may be given with advantage; or some simple diaphoretic, as nitre and water, or the neutral mixture, may be used through the day, and a warm foot-bath or an immersion bath given in the evening. When the constitution is feeble, and the child weak or anemic, tonic remedies are indicated. The best is probably quinine, or one of the ferruginous preparations; or the compound infusion of gentian, with addition of Huxham's tincture of bark, may be resorted to. If the inflammation be severe, and accompanied with tumefaction and tenderness of the glands and some febrile reaction, it might be proper to apply a few leeches to the neck, though I have never found this to be necessary. The best internal remedy, however, and indeed the only one of any kind that is necessary in most cases, is the chlorate of potash. This is spoken of in the highest terms by Dr. West, of London, who regards it almost as a specific. I have used it now in a large number of cases, and during the last eight years, have seldom found it necessary to employ any other means, excepting some mild cathartic dose where the bowels have been constipated, and a wash of borax or alum in honey of roses, or borax in simple honey. The symptoms have begun to amend in every case in from three to four or five days, and recovery has taken place in about a week or a little more. The dose is from two to three grains every four hours for a child three years of age, and four or five grains for one of nine or ten years. I have usually prescribed it in the dose of two grains four times a day, in a mixture of syrup of ginger and water, for children three or four years old.

Prior to the discovery of the efficacy of the chlorate of potash in this affection, the *local treatment* constituted the only effectual and reliable means of removing it, and the most violent and painful applications were thought necessary and were made use of. Strong solutions of nitrate of silver, and pure or diluted muriatic acid, were frequently employed in severe cases. Now, however, these caustic substances may probably be entirely dispensed with, except in cases that show a tendency to assume the form of gangrene of the mouth. In ordinary cases the only local applications that need be used, and these are not essential when the child resists very much, are demulcent washes to keep the mouth clean—to be employed in the manner recommended in the article on aphthæ, and some mild astringent wash. This may consist of borax and honey, or borax and sugar, in the proportion of two or three parts of the former to one of the latter, or, what is in my opinion preferable to either of these, of a drachm of borax rubbed up with an ounce of honey of roses.

Should the disease resist the treatment by the chlorate of potash and the simple washes just now recommended, we may employ the following combination, proposed by Dr. Dewees, and of which he says that it "has so far never failed us:"

℞.—Sulph. Cupri, ...	gr. x.
Pulv. Cinch. Opt., ...	ʒij.
Pulv. G. Arab., ...	ʒi.
Mel. Commun., ...	ʒij.
Aquæ Font., ...	℥iij.—M. et ft. sol.

The ulcerations to be touched with the mixture twice a day, with the point of a camel's-hair pencil. Or, we may resort to the following one, recommended by Dr. Coates (*Loc. cit.*), and of which he says, that he "settled down, after various trials, in the employment of the following:

℞.—Sulph. Cupri,	ʒij.
Pulv. Chinchonæ,	℥ss.
Aquæ,	℥iv.—M. S.

To be applied twice a day, very carefully, to the full extent of the ulcerations and excoriations."

MM. Rilliet and Barthez recommend very highly the plan pursued by M. Bouneau at the Children's Hospital. This is to cleanse the mouth first, and then to apply dry chloride of lime (calx chlorinata of the pharmacopœia), to the diseased surfaces. The application is made by means of a piece of rolled paper, or a stiff pencil, which is to be moistened and then dipped into the powder so that some may adhere, or with the finger. The surfaces are to be gently rubbed with the powder, and after a few moments' contact, washed clean with pure water. This is to be done twice a day, until the ulcerations assume a clean, healthy appearance, after which the following mouth-wash is to be employed:

℞.—Mucil. G. Acac.,	℥i.
Syrup Cort. Aurant.,	℥ss.
Calc. chlorinat.,	℈i.—M.

The chief danger from the disease depends on the circumstance that it sometimes terminates in gangrene of the mouth, to be presently described. Any disposition to such a termination should be carefully watched, and the proper preventive means, consisting of local stimulating or caustic applications, with the internal use of stimulants and tonics, be at once resorted to.

ARTICLE IV.

GANGRENE OF THE MOUTH.

Definition; Synonymes; Frequency.—Gangrene of the mouth is an affection which occurs chiefly in children of debilitated constitution. It begins generally by ulceration of the mucous membrane of the cheek, which, after a longer or shorter time, runs into gangrene, and extends rapidly to the gums; after a few days, if the disease be not arrested, the central tissues of the cheek become thickened and indurated, an eschar forms upon the integument, and spreads in depth and width, until at last the cheek may be perforated, the whole side of the face and jaws destroyed, the teeth loosened, and the maxillary bones exposed and necrosed. It is known by a great variety of names: grangrænopsis, cancrum oris, gangræna oris, kanker of the mouth, gangrenous erosion of the cheeks of Underwood; necrosis infantilis, gangrenous stomatitis, &c. It is a *frequent* disease in the hospitals for children in Europe, and a not uncommon one in institutions of the same kind in this country. It sometimes prevails endemically in hospitals. It is a rare disease in private practice. I have as yet met with only one case, excepting in public institutions.

Predisposing Causes.—The disease is nearly, but not exclusively confined to the period of childhood. It is most common between the ages of three and six years; is very rare, but does sometimes occur in infants; and is of nearly equal frequency probably in the two sexes. Unfavorable *hygienic conditions* constitute a strong predisposing cause. Children living in hospitals or any crowded institution; those whose parents are poor or in want, and whose constitutions have been greatly deteriorated by long illness, by the tubercular diathesis, or by acute diseases, are particularly apt to be attacked. It almost always follows upon some previous acute or chronic disease, particularly measles, or some other acute exantheme; pneumonia; entero-colitis; hooping-cough; long-continued malarious fevers, &c. MM. Guersant and Blache say (*Dict. de Med.*, t. 28, p. 601), "The existence of some anterior disease is a necessary condition of gangrene of the mouth: we have never known it, nor has M. Baron, to occur as an idiopathic affection." It has been affirmed by some persons to be *contagious*, but this is exceedingly doubtful. The fact of its occurring sometimes in an endemic form has already been referred to. It has been known also to prevail as an epidemic.

The *exciting causes* can rarely be ascertained with any certainty. The only one which seems to have been proved to exist in some instances, is the exhibition of large doses of the mercurial preparations, and even this is questioned by some very good authorities.

Anatomical Lesions.—Upon examination after death, it is found that the *integument* surrounding the mortified spot, soon runs into putrefaction. The lip or cheek in which the disease is seated is swelled, hardened, tense, and shining, of a purple or greenish color, and presents a deep, circumscribed engorgement. On the most prominent part of the swelling there often exists a rounded or oval, and distinctly limited eschar, of variable size, from that of a small bean to that of a dime, or a quarter or even half a dollar. In other instances the cutaneous slough is much larger, and extends irregularly to different parts of the face, to the chin, neck, eyelids, and even to the neighborhood of the ear, so as to occupy the whole of one side. Under these circumstances, the tumefaction is neither so considerable, nor so regular, as when the slough is smaller. The eschar is always black, and generally dry and parchment-like, and extends a third or two-thirds of a line in depth, or quite through the integument. The tissues beneath the skin are not generally implicated, though in some cases the eschar is detached, and there is a perforation of the cheek through which may be seen the alveolar processes.

The *mucous membrane* of the mouth is always affected with mortification.

The disease may be limited, so as to exist in the form of an elongated ulceration, of a dark grayish color, situated in the fold where the mucous membrane is reflected from the cheek to the lower jaw; or, in a larger proportion of cases, it is seated on the internal surface of the cheek, opposite the interval between the alveolar processes. Sometimes the disease is much more extensive, and occupies all or a part of the internal surface of the cheek. In such instances the whole thickness of the mucous tissue is destroyed, and it presents upon its surface a blackish or brownish pultaceous slough, almost liquid in consistence, which may be scraped off with a scalpel, leaving beneath loose shreds of mucous membrane, without any trace of organization. The gums frequently participate in the disease, and are converted into shreds, or completely destroyed.

The *maxillary bones* are sometimes, in severe cases, when the disease has extended to the gums, exposed, blackened, and even necrosed. The *teeth* are very often uncovered and loosened, and not unfrequently some are lost. The *tissues* between the skin and mucous membrane are found either hardened and infiltrated, or sphacelated to a greater or less extent. In the least severe cases, the fatty cellular tissue and the muscular structure of the cheek are infiltrated with serum, but preserve their organization. When the disease is more aggravated, the gangrene extends to these tissues also, and always to those adjoining the mucous membrane first; so that the cellular structure beneath that membrane, and then the muscles, are infiltrated with a sanious fluid, and either in a state of sphacelus or tending thereto, whilst some of the adipose tissue beneath the skin is still merely infiltrated. In yet worse cases, the sloughs formed on the two surfaces of the cheek come into contact, and if their separation from the sound parts has taken place, a perforation is the consequence.

The condition of the *bloodvessels* in the midst of the diseased parts has been carefully examined by MM. Rilliet and Barthez. These authors state that when the tissues of the cheek are merely infiltrated, the vessels remain healthy, permeable, and their parietes are scarcely or very slightly thickened. When the vessels run along the edge of the slough, they are still permeable, but their walls are thickened, and begin to assume the appearances of the mortified tissues. Lastly, when they traverse the centre of the eschar, they can still be traced out, but their canals are found obliterated by coagula, in the whole extent of the mortified parts; or else the coagula occupy the vessels at their points of entrance into and exit from the slough, while between these points their walls are thickened, tend to assume the color and softness of the putrefied tissues, and their canals are filled with pultaceous gangrenous matter. The writers quoted do not suppose that the obliteration of the vessels is the cause of the sphacelus, since that change occurs only after the death of the surrounding tissues has already taken place.

The disease very rarely occurs on both sides of the mouth at once, though this does occasionally happen.

The *submaxillary glands* are nearly always in their natural condition, but in rare instances are softened and engorged.

Gangrene of the mouth never, or very rarely indeed, exists without lesions of other organs. Of these the most frequent are acute pulmonary affections, and after them, acute or chronic diseases of the gastro-intestinal tube, and then malarious fevers, pleurisy, pneumo-thorax, peritonitis, and nephritis.

SYMPTOMS; COURSE; DURATION.—The following account of the symptoms of the disease is taken chiefly from the work of MM. Rilliet and Barthez. Gangrene of the mouth generally begins during the course or convalescence of some acute or chronic disease, by ulceration, aphthæ, or phlyctenæ, of the mucous membrane, and in rare instances, by œdema of the substance of the cheek. At the same time the face is pale, and usually continues so throughout the disease; the nostrils and eyelids are often incrusted, and the latter infiltrated or sunken, and surrounded by bluish circles; the lips are swelled and covered with scabs, or dry. The breath of the child is fetid from the beginning, and as the disease progresses becomes gangrenous. There is but little fever at first, unless the case be accompanied by some acute disease: the pulse is commonly frequent and small in the beginning, rising gradually from 80 or 90 to 100 or 120, and becoming insensible towards the end; in cases occurring in the course of other diseases, the pulse rises sometimes to 120 or 140, and is larger and fuller. The child is generally languid and quiet at first, or more rarely, cross and peevish. The strength may be either lost entirely, merely diminished, or the patient may retain a sufficient amount of force to sit up and observe what is going on around, and even to leave the bed the day before death. Half the children observed by MM. Rilliet and Barthez, in whom this symptom was noted, sat up in bed until within a few days of the fatal termination. In most cases but little complaint is made of pain in the mouth, though in some it is said to be severe.

The ulceration already spoken of as forming the first symptom of the disease, is generally of a grayish color, and resembles very closely that which exists in the ulcero-membranous form of stomatitis. It may be seated either on the gums, in the fold formed by the junction of the cheek or lip with the gum, or on the inside of the cheek, opposite the space between the alveolar processes. It may present a gangrenous appearance from the first day, or not until after two or three days; or lastly, it may pass through the stages characteristic of ulcerative stomatitis, and terminate in the affection under consideration. Dr. B. H. Coates (*Loc. cit.*) describes under the title of gangrenous sore mouth of children, the ulcero-membranous form of stomatitis, and a few cases of gangrene, and states that three or four children out of 120 affected with ulcerated gums, "suffered small spots of mortification, and one, by the delay arising from the tardy report of a nurse, suffered necrosis in a portion of an alveolus."

The ulcerations just described assume the following appearances as the gangrenous nature of the malady develops itself. They become grayish, and then dark in color, bleed easily when touched, and are covered with pultaceous sloughs, exhaling a characteristic fetid odor. The gangrene extends to the neighboring parts, from the gum to the cheek, or from the cheek to the gum, and implicates at last the whole side of the mouth, or of the lower lip. At the same time the affected cheek or lip undergoes a circumscribed infiltration, which is at first rather soft, but becomes afterwards firmer, and forms at last a hard and rounded knot or tumor in the centre of the cheek, which is now tense, shining, and pale, or marbled with purple spots, while the slough on the inside is of a brownish color, more extended in size, and sometimes surrounded by a dark ring. The hard tumor of the cheek just described, usually appears between the first and third days after the sphacelation of the mucous membrane, though in some instances, not until a later period. It is formed, as stated in the account of the anatomical lesions, by engorgement of the cellular and adipose tissues. The child, at this stage, is still able to sit up in bed and take notice, or shows evident signs of weakness and depression; the face is swelled, and destitute of expression on the affected side; a bloody or dark-colored saliva runs from the mouth, which is partially open; the appetite is not entirely lost in all cases, the patient still demanding and taking food; vomiting is rare, but diarrhœa is almost always present; the thirst is generally intense; the skin is warm and feverish, natural, or too cool, and almost always dry, the differences depending probably more upon the concomitant disease than upon the mouth-affection. The respiration is natural or altered according to the nature of the primary disease, which is, as already stated, in the majority of the cases, a pulmonary affection. The intelligence is generally undisturbed, though in some rare cases there is insomnia, delirium, or piercing cries.

If the disease continues to progress, as it almost always does when it has reached the stage I am describing, there appears in many, but not all the cases (8 of the 21 observed by MM. Rilliet and Barthez), a slough or eschar upon the most prominent and discolored part of the swelling of the integument of the cheek or lower lip. This generally makes its appearance between the third and sixth days of the disease, but in other cases, as early as the second, or not before the twelfth, or even later The skin, at the point where the eschar is about to form, becomes purple, and then black; sometimes a phlyctæna makes its appearance, which is very soon converted into a small, dry, black slough. This, if not limited by a process of separation from the living tissues, becomes larger and larger by the extension of the sphacelation, until it may, as already stated, embrace the whole side of the face. In grave and fatal cases, the gangrene sometimes extends to all the tissues of the cheek, and meeting, at last, the disease which had commenced on the inside of the mouth, occasions a perforation, through which may be seen the teeth, alveolar processes, and the whole interior of the buccal cavity. In such instances as these, one of which I saw in the Pennsylvania Hospital, the appearance presented by the child is, as may well be imagined, of the most pitiable kind. Even under these circumstances, however, with the cheek perforated, the edges of the opening irregular and covered with shreds of dead tissue, the gums destroyed, the teeth loosened, and the maxillary bones exposed, blackened, and perhaps necrosed, with a dark and fetid sanies flowing from the mouth or perforation, and a putrefactive smell infecting the air around, the child is said to retain, in some instances, its strength, so as to sit up in bed, ask for food, and drink with avidity. In other cases, on the contrary, the patient, at this stage, is exhausted to the last degree, and refuses both food and drink. During the closing stage of the disease, there is generally profuse diarrhœa, rapid emaciation, dry skin, small, rapid pulse, and at last death in a state of utter prostration.

In favorable cases the recovery may take place in the early stage, before the integument becomes involved, and while the gangrene is limited to the mucous membrane, or at a later period, after the slough has separated. In the first instance the child generally recovers without deformity, though I saw one case in which necrosis of about an inch of the front of the inferior maxilla took place, without any loss of the soft parts. When the child recovers after the formation of the cutaneous slough, a very rare event, the gangrene ceases to extend, the eschar separates and is cast off, the edges of the opening assume the appearances of a healthy ulcer, and after a length of time, approach each other and cicatrize, leaving generally a large, uneven, discolored scar, like that of a burn, which remains through life a horrid deformity.

The *duration* of the disease varies according to its termination. When this is unfavorable, which happens in much the larger proportion of cases, death usually occurs about the end of the first, or in the course of the second week, though it has been known to occur at a later period. In favorable cases the duration is commonly longer, particularly if a cutaneous eschar has been produced, as the separation of the slough and cicatrization of the ulcer which remains, require a tedious and slow process on the part of nature.

Complications are very apt to arise in the course of the disease. The most frequent is pneumonia. MM. Guersent and Blache state that it exists in nine-tenths of the cases; MM. Rilliet and Barthez found it in 19 out of 21; of the 19, it began in 8 during the progress of the gangrene, and apparently under the influence of the latter, whilst in the remaining cases it existed before, and acted perhaps as a predisposing cause to the affection of the mouth. Another and more dangerous complication is the occurrence of gangrene in other parts of the body, particularly the soft palate, pharynx, œsophagus, anus, and more frequently the vulva and lungs.

DIAGNOSIS.—Some authors have described as identical affections, under the title of gangrenous stomatitis, the disease under consideration, and the one already treated of as ulcero-membranous stomatitis. This has been done particularly by M. Taupin, who is followed in his description by M. Valleix (*Guide du Méd. Prat.*, t. iv). It seems clear to me, moreover, that Dr. B. H. Coates, in his very valuable paper on the "gangrenous sore mouth of children" (*Loc. cit.*), and Dr. Condie, in his article on "gangrene of the mouth," mingle in their descriptions the two diseases referred to. I cannot but think, however, that the differences between them as to frequency, symptoms, course, amenability to treatment, and termination, which are fully pointed out in the diagnostic table below, and lastly the example of MM. Baron, Billard, Guersant, Rilliet and Barthez, and Dr. G. B. Wood, fully warrant me in regarding them as different and distinct diseases.

The diagnosis of gangrene of the mouth is, in most cases, very easy. The ulceration of the mucous membrane, followed by gangrene; the deep-seated induration of the cheek, at first pale on the outside, then dark-colored, and terminating after a time in a characteristic slough; the course of the malady, and the nature of the general symptoms, will generally prevent any difficulty in the recognition of the disease.

From stomatitis it may be distinguished by attention to the points laid down in the following table, taken from MM. Rilliet and Barthez:—

STOMATITIS.	GANGRENE.
Begins by ulceration or by pseudo-membranous plastic deposit.	Begins by ulceration, which is sometimes gangrenous from the first, or by œdema of the cheek.
Odor very fetid and sometimes gangrenous.	Odor always gangrenous.
But little extension of the local lesion, which always retains the same appearances.	Considerable and rapid extension; the tissues assume a peculiar dark-grayish tint.
But little swelling of the cheek or lips, or simply œdema of those parts, without deep-seated induration, tension, or unctuous appearance.	Extensive swelling and œdema of the cheek, with deep-seated induration, tension, unctuous appearance, purple spots.
Salivation rarely so considerable as to flow from the mouth; when present sometimes sanguinolent; never mixed with shreds of gangrenous tissue.	Salivation abundant; constant escape of fluid, at first sanguinolent, afterwards putrefactive.
Never an eschar on the exterior.	Often an eschar upon the cheek or lips.
Never complete perforation of the soft	Perforation of the soft parts frequent;

parts; denudation of the bones never occurs; loss of the teeth very rare.	denudation of the bones constant; loosening of the teeth constant, and their loss frequent.
Course of the disease slow when left to itself; recovery rapid under the influence of treatment.	Course rapid, and fatal termination, as a rule, when the disease is left to itself, and in spite of all treatment.

Gangrene of the mouth may be confounded with malignant pustule. The method of diagnosis has been drawn by M. Baron in the following words: "Malignant pustule always begins on the exterior; affects the epidermis first, and extends successively to the corpus mucosum, chorion, and subjacent parts; whilst, on the contrary, the gangrene under consideration attacks the mucous membrane first, then the muscles, and lastly the skin."

Prognosis.—The prognosis of true gangrene of the mouth is exceedingly unfavorable. The great majority of the subjects die in spite of all that can be done. Dr. Coates (*Loc. cit.*, p. 14) says that a black spot on the outer surface of the swelling "has always been in my own experience, the immediate harbinger of death. It is proper to state, however, that I have heard it said that cases had recovered in this city, in which the gangrene had produced a hole through the cheek." MM. Rilliet and Barthez state that "death is the ordinary termination of gangrene of the mouth; though there are instances of recovery on record." Of 29 cases analyzed by them, only 3 recovered. MM. Guersant and Blache (*Loc. cit.*, p. 596) state that unless arrested in the formative stage, it ends fatally almost constantly in from five to ten days, and frequently before perforation has taken place. Of 36 cases observed by M. Taupin in the Children's Hospital, at Paris, not one escaped (Guersant and Blache, *Loc. cit.*, p. 597). The authors of the *Compendium de Médecine Pratique*, say of this disease (t. i, p. 632), "Death is the almost inevitable termination." Dr. Marshall Hall (*Edin. Med. and Surg. Journ.*, xiv, p. 547), reports six cases of the disease, two of which followed measles, one repeated attacks of pneumonia, one fever (type not mentioned), one worm fever, and one typhus fever. All but one, the case occurring in the course of typhus fever, in a girl twelve years old, died. This girl recovered, with, however, falling-in of the right cheek, "a frightful chasm" on the left side of the mouth, and caries of a portion of the alveolar process, palate bone, and second molar tooth. Recoveries sometimes occur, however, as in the case mentioned by Dr. Hall, after perforation, but nearly always with terrible deformities, with adhesions of the walls of the mouth to the jaws, with incurable fistulæ, &c.

The prognosis is more favorable in private practice than in hospitals. The favorable circumstances in any case are: good hygienic conditions; vigorous constitution of the child; the absence of dangerous concomitant disease; the continuance of appetite and strength; and a disposition to limitation and separation of the slough. Unfavorable symptoms are: weak and debilitated constitution of the patient; severe coexistent disease; prostration of the strength; and extension of the sloughing process.

TREATMENT.—The reader need but refer to the remarks on prognosis to be assured that no treatment as yet discovered promises much success. I would call attention also to the following statement,—that the remarks about to be made apply only to true gangrene of the mouth, and not to all the cases described by some writers under the title of gangrenous sore mouth or even that of gangrene of the mouth, since, as already stated, they confound together true gangrene and ulcero-membranous stomatitis.

The treatment is divided into *local* and *general*. The *local treatment* recommended by the French writers, consists in cauterization of the sloughing parts with one of the mineral acids, with nitrate of silver, or with the actual cautery. This is the plan proposed by MM. Billard, Baron, Guersant and Blache, Barrier, Rilliet and Barthez, Bouchut, and Valleix. The authors of the Bibliothèque du Médicin Praticien remark, however, that nearly all the patients subjected to cauterization die, and that of the small number saved, there are as many who had not been subjected to that treatment, as there are of those to whom it had been fully applied. They wonder, therefore, that recent authors continue to repose the same confidence in it, as did their predecessors. "For us," they say, "we are of opinion that cauterization exerts but slight influence, if it have any at all, and it is greatly to be desired that the zeal of practitioners might discover some more efficacious remedy." (*Loc. cit.*, t. v, p. 551.)

It is very important to make use of the caustic application as early after the beginning of the sphacelus as possible, for if it be allowed to spread to any considerable depth or extent, there is scarcely a hope of arresting it by any means. MM. Guersant and Blache recommend pure nitric, sulphuric, or muriatic acid; MM. Rilliet and Barthez propose the acid nitrate of mercury, or muriatic, sulphuric, or acetic acid; M. Valleix proposes the treatment employed by M. Taupin, which is to remove the pseudo-membrane and a part or the whole of the gangrenous eschar with scissors, to make some scarifications upon the healthy parts, to apply pure muriatic acid, and after the fall of the slough, to make use of dry chloride of lime (calx chlorinata). The acid most generally employed is the muriatic. The local treatment proposed by MM. Rilliet and Barthez is the following: as soon as the ulcerations assume a gangrenous appearance, to touch them with a brush or sponge dipped into acid nitrate of mercury, or pure muriatic acid, the brush to remain in contact with the sloughs for a few instants, and then to be applied rapidly around and on the parts beyond them. After this cauterization, an application is to be made of dry chloride of lime (in the manner recommended in the article on ulcero-membranous stomatitis), which is to be left in contact with the sloughs for a few minutes, when the mouth must be thoroughly washed with a strong jet of water from a syringe. The cauterization and use of the chloride of lime are to be resorted to twice a day, and the mouth washed three or four times in the interval with large injections of simple water, barley water mixed with honey of roses, or better still, with a strong decoction of cinchona. If the case goes on favorably, and the sloughs separate, the cauterizations are to be suspended, and the chloride of lime alone employed. If, on the contrary, a slough forms on the outside of the cheek, a crucial incision must be made into it, and a brush charged with the same caustics introduced between the cuts; powdered cinchona is then placed in the openings, and retained there by a piece of diachylon plaster, or by pledgets of charpie, dipped in a solution of soda. This treatment is to be continued until the slough separates, when the edges of the wound, and all the diseased parts that can be reached, are to be cauterized.

In applying escharotics to the mouth, certain general precautions are required, of which it is necessary to give some account. When they are used upon the inside of the cheek, a spoon must be introduced into the mouth, with the concavity directed towards the alveolar processes, in order to preserve the teeth and tongue from being touched. When the application is made upon the gums, the cheek should be drawn to one side by an assistant, and the tongue pushed out of the way with the finger, or a spoon. If the acid happen to touch the teeth or tongue, it must be instantly washed off. The mouth ought always to be thoroughly cleansed with water immediately after the cauterization, to remove any superabundance of acid.

The kind of brush most suitable for the application of the mineral acids is one made of charpie, strongly tied to a solid handle. The sponge-mop, which is sometimes used, is made by fastening a small piece of fine sponge to the end of a stick.

MM. Guersant and Blache recommend that the acid be applied to the slough every hour, until the sphacelus ceases to extend. They state that this plan is sometimes advantageous when the gangrene is confined to the gums only, but that it is generally powerless when the disease has extended to the cheek, or has implicated the deep-seated tissues. Under the latter circumstances, and when the inefficacy of caustics has been shown by trial, they propose the use of the actual cautery, as recommended by M. Baron and other distinguished practitioners, and which, they add, has afforded them some brilliant results in very bad cases.

M. Barrier advises that we should accurately expose the diseased parts by crucial incisions, and apply the escharotic to all the parts forming the limits of the gangrene, in such a way that the tissues already disposed to slough shall be thoroughly cauterized, while those a little beyond are so in a less degree.

The English writers, and those of our own country, seem rather less disposed than the French, to make use of powerful escharotics, and lay more stress upon the general treatment. Underwood, following Mr. Dease, of Dublin, advises that "the parts should be washed and likewise injected with muriatic acid, in chamomile or sage tea, and afterwards dressed with the acid, mixed with the honey of roses, and over all a carrot poultice." Dr. Symonds (*Libr. of Pract. Med.*, vol. iii, p. 23), directs the cheek to be frequently rubbed with a stimulating embrocation of camphorated oil and ammonia, on the first appearance of the swelling, and in the intervals to be kept moist with a tepid lotion containing muriate of ammonia and alcohol. On the slightest appearance of an eschar upon the interior of the mouth, it is to be touched with solid nitrate of silver, or strong muriatic acid. If sloughing have already commenced, the nitrate of silver lotion is said to be the best application. The mouth is to be frequently washed or syringed with a solution of chloride of soda, and when mortification has taken place, we are to endeavor to prevent it from spreading, by carrot or fermenting poultices. Maunsel and Evanson say that the early application of muriatic acid, undiluted, or mixed with one or two parts of honey, is the only efficient application in these forms of gangrene. Dr. Gerhard (*Libr. of Pract. Med.*, vol. iii, Am. Ed., p. 24), says, "the best local applications are the nitrate of silver, if the slough be small in extent; if much larger, the best escharotic is the muriated tincture of iron, applied in the undiluted state; after the progress of the disease is arrested, the ulcer will improve rapidly under an astringent stimulant, such as the tincture of myrrh, or the aromatic wine of the French Pharmacopœia." Dr. Dunglison (*Pract. of Med.*, vol. i, p. 36) recommends the application with a brush, of a mixture of equal parts of creasote and alcohol, after incisions have been made through the gangrenous parts. Dr. Condie (*Loc. cit.*, p. 150) states that he has found a strong solution of sulphate of copper (thirty grains to the ounce of water), applied very carefully twice a day, to the full extent of the gangrenous ulceration, by far the most successful lotion.

It seems to me very clear, after the study of the treatment recommended by the different writers quoted above, that the most important part of the local management of the disease, is the early application of some escharotic substance to the ulcerations, or to the mortifying parts; the best is probably pure muriatic acid. This should be made use of twice or three times a day, observing the precaution to wash the mouth, immediately afterwards, with water, by means of a syringe. Later in the disease, when it has extended to the skin, the use of escharotics, or of the actual cautery, is still recommended by many writers, but opposed by others. I confess I should be inclined to prefer, at this stage, the use of muriated tincture of iron, as recommended by Dr. Gerhard, of strong lotions of sulphate of copper, of solutions of nitrate of silver of moderate strength, or of the dressings of muriatic acid and honey of roses, as proposed by Underwood, in connection with carrot and fermenting poultices, as recommended by Underwood and

Symonds. Throughout the course of the disease the mouth ought to be frequently cleansed by washing or injecting with solution of chlorinated soda, mixed with eight parts of water, which corrects at the same time the terrible fetor of the disease.

General Treatment.—All writers recommend the use of tonics, stimulants, and nutritious diet, unless the presence of high fever, or the state of the digestive organs, seems to contraindicate their employment. Without personal experience on which to found such an opinion, but from a consideration of what I have seen most successful in other forms of gangrene, as that following accidents and surgical operations in deteriorated constitutions; from what proved effectual in a case of idiopathic gangrene of the vulva, in a child ten years of age, which came under my charge; and from what is necessary in that analogous condition of the constitution which accompanies typhoid and cachectic diseases, I am induced to believe that the general treatment must be of as great or nearly as great importance as the local, and that the steady and persevering use of tonics, stimulants, and of the most strengthening diet, should always be insisted on from the earliest period, whether fever be present or not. The quantity of stimulants and the amount of food, ought, it seems to me, to be measured only by the capacity of the digestive organs to receive and assimilate them. Of the tonics, the best is quinine, which may be given suspended in syrup, in doses of a grain four or five times a day, to a child three or four years old. The most suitable stimulants are very fine old brandy, Madeira wine given in considerable quantities, and, if the stomach is sure to receive it well, carbonate of ammonia, or better still, the aromatic spirits of hartshorn. The diet must consist of milk, made into punch with brandy, wine-whey, the yolks of eggs beaten up with wine, rich soups, animal jellies, and, if the child wish it, of tender meat finely minced.

The room in which the child is placed ought to be large, if possible, and at all events, thoroughly ventilated.

ARTICLE V.

THRUSH.

Definition; Synonymes; Frequency; Forms.—Thrush is a deposit upon the mucous membrane of the mouth of a whitish or grayish-yellow exudation, of a soft cheesy consistence, at first adherent, and afterwards spontaneously detached, and generally unaccompanied by ulceration of the tissue beneath. This constitutes the whole disease in some cases, no other lesion being discoverable; whilst in other instances, and probably in a large majority, it is connected with some more or less serious general or local disorder. It is the disease described under the title of aphthæ or thrush, by Underwood and Eberle; of aphthæ, by Dewees; of erythematic stomatitis with curd-like exudation, by Dr. Condie, and of aphtha lactantium, aphtha lactamen, and aphtha infantilis, by the older writers. It is the muguet of the French.

The *frequency* of the disease is very great in hospitals for children. It is common also amongst the children of the poor, and comparatively rare in the middle and upper classes of society. It occurs under two forms, the *idiopathic* or *primary*, and *symptomatic* or *secondary*. By the first is meant the form in which the affection of the mouth is the only perceptible lesion; by the second, that in which disease of other organs, or of the constitution generally, precedes the buccal exudation.

CAUSES.—PREDISPOSING CAUSES.—The disease occurs at all *ages*, but is by far most common during the first two months of life. *Altered health* from any cause, *deficient ventilation*, and *want of cleanliness*, strongly predispose to the production of thrush. Much difference of opinion exists as to the nature of the connection between *enteritis* and thrush, especially since the publication of the researches of M. Valleix, who thinks that the latter disease is almost always the consequence of the former, and who doubts the existence of purely local cases of thrush. MM. Trousseau and Delpech, on the contrary (*Journ. de Méd. de MM. Beau et Trousseau*, January, February, April, May, 1845), report 14 cases out of 58, in which there was neither gastric nor intestinal complication, and others in which enteritis did not occur except as a consequence of thrush. They state, however, that though enteritis does not exist in all cases, and is a simple complication in others, it is sometimes the true cause, the sole origin of the disease. Again, Dr. Berg, in a very accurate and careful history of the disease (*Brit. and For. Med. Rev.*, October, 1847, p. 429), in which he asserts and endeavors to show its *cryptogamic nature*, states "that both the local and general symptoms which accompany thrush in the child are, in most cases, immediate or secondary consequences of the presence of the parasite, and not to be regarded as the causes of that fungoid vegetation." It is believed by many observers to be *contagious*. This opinion is rendered doubtful, however, by the assertion of MM. Baron, Billard, Guersant, and Valleix (*Loc. cit.*, t. iv, p. 63), that they have known children in health to be fed with the same spoon which has been used for others affected with the disease, without their contracting it. M. Bouchut, on the contrary, and Dr. Berg (*Loc. cit.*), both of whom believe in the cryptogamic nature of thrush, assert it to be contagious. Dr. Berg is of opinion that it is "conveyed from one patient to another by sporules or fragments of sporules, in the dried state, floating in the atmosphere, but that still more frequently it is propagated by the bottles from which children with thrush have been fed, or by the nipple, especially where, as in many hospitals, two children are suckled by one nurse." This gentleman made many experiments in order to decide this question, all of which proved favorable to the idea of contagion.

Of various predisposing causes which have been cited as productive of the disease, the ones most generally admitted are the use of *artificial diet*, particularly one consisting of farinaceous substances, and, in children who are suckled, an *unhealthy state* of the nurse's milk. To show the truth of these assertions, I make the following quotations. Underwood says: "A principal remote cause of this disease seems to be indigestion, whether produced by bad milk, or other unwholesome food, or by the weakness of the stomach." Dewees remarks that "children fed much upon farinaceous substances, are especially exposed to the attacks of this disease, particularly when their food is sweetened with brown sugar or molasses." Dr. Eberle says: "Unwholesome and indigestible nourishment, and over-distension of the stomach, during the early stages of infancy, almost inevitably lead to the occurrence of aphthæ (thrush). Bad and old milk, and thick farinaceous preparations sweetened with brown sugar or molasses, are especially apt to give rise to the disease." Much influence is ascribed by Dr. Berg to the operation of artificial food in favoring the growth of aphthæ. M. Valleix (*Loc. cit.*, p. 60), who has studied the subject with the greatest care and attention, says that amongst the hygienic conditions which may act as predisposing causes "one alone has seemed to me to exert a positive influence, and this is *improper alimentation.*" He adds, that since the publication of his "Clinique," he has several times met with cases of thrush, "and I have always found that the children had been put upon feculent diet. On the other hand, I have never known a child to have the disease, who had been suckled exclusively during the early months of life." MM. Trousseau and Delpech, in the very valuable paper on muguet (thrush), already quoted, say: "We would be justified, therefore, in asserting, that we have never known an infant to die of thrush, who had been suckled at a healthy breast, or whose health had not been dangerously compromised by other causes." To show in another mode the influence of this cause, I will state that of 29 cases of the disease observed by these gentlemen in children who were suckled, only 7, or one-fourth, died; whilst of 22 in those who were not suckled, 17, or more than three-fourths, died. My own experience is precisely that of MM. Valleix, Trousseau, and Delpech.

Season exerts a considerable influence upon the production of thrush, as M. Valleix found that more than half the cases occurred during the three warmest months of the year.

Exciting causes.—The deprivation of the breast, and a consequent resort to artificial diet, particularly one consisting of farinaceous substances, is probably much the most frequent exciting cause of thrush. An unhealthy state of the milk of the nurse will also act as an exciting cause. I have met with two cases of the disease, one of them fatal, which appeared to depend upon the latter circumstance. Dr. Berg believes that prolonged sleep from any cause disposes to the disease, by favoring the growth of the parasite, or by so changing the secretions of the mucous membrane of the mouth, as to render them important agents in augmenting the disorder. An acid state of the buccal secretion is cited as a cause by many authors, and is clearly proved to exist in a great many instances.

ANATOMICAL LESIONS.—The characteristic exudation is found upon the mucous membrane of the mouth, pharynx, œsophagus, and in very rare cases, of the stomach and intestines. It is a curious fact, and a very important one, insisted upon by MM. Trousseau and Delpech, and other observers, that the false membrane never extends to the nasal or air-passages; and they call attention to the singular difference in this respect between the affection under consideration and diphtheritic inflammation, which attacks almost exclusively the nostrils, pharynx, larynx, and bronchia.

Lesions of the digestive mucous membrane are met with in nearly all the cases. M. Valleix states that softening of the gastric mucous membrane is almost constant, and that it is often accompanied by redness and thickening. The authors cited above are of opinion that the gastric lesions have been greatly exaggerated, and assert them to be much the same as exist in other diseases foreign to the digestive apparatus. Various morbid alterations of the mucous membrane of the intestines exist in nearly all fatal cases. This fact is acknowledged as well by MM. Trousseau and Delpech, who deny the invariable connection of these alterations with thrush, as by M. Valleix, who asserts the connection almost without reserve. In nearly all cases the mucous membrane of the large intestine presents some of the following lesions, which are mentioned in the order of their frequency: thickening, injection, softening, or ulceration. In the ileum are found, in a great many cases, injection, softening, or thickening of the mucous membrane, unusual development of the mucous follicles, and tumefaction and ulceration of the glands of Peyer.

In severe symptomatic cases a certain amount of erythematous inflammation is commonly found upon the skin of the buttocks and thighs, and ulcerations sometimes exist upon the inner ankles. Traces of inflammation sometimes, but very rarely, exist in the membranes of the brain, and the lungs not unfrequently present the lesions of secondary pneumonia. Before leaving this part of the subject, I may remark that in the few cases I have met with in private practice, no ulcerations occurred upon the malleoli, and the erythema was observed only in the neighborhood of the anus.

Dr. Dewees describes the autopsy of a child who died about the end of the first month of life, of what he designates as aphthæ. The lesions coincide so closely with those which are characteristic of thrush, that I will quote the description, in order that the two may be compared together by the reader. "We found the whole tract of the œsophagus literally blocked up with an aphthous incrustation, to the cardia, and there it suddenly stopped. The inner coat of the stomach bore some marks of inflammation, as did several portions of the intestines; but not a trace of aphthæ could be discovered below the place just mentioned." In the previous description of the case, he says that coat after coat of aphthæ were thrown off, and each new crop appeared to be more abundant, and less amenable to remedies. (*Dewees on Children*, p. 304–305.)

Dr. Eberle says: "I have myself had an opportunity of examining the body of an infant, that had died of this disease (aphthæ or thrush). In this case the aphthæ were very distinct, throughout the whole course of the œsophagus. The stomach and bowels presented nothing that bore any resemblance to this eruption; but there were decided marks of inflammation in the mucous membrane of the small intestines, with a vast number of minute superficial ulcerations, and larger patches of softening of this tissue, throughout the colon, and lower part of the rectum." (*Diseases of Children*, p. 172–173.)

SYMPTOMS.—I shall first describe the characters of the exudation, and then proceed to the consideration of certain general and local phenomena which exist to a greater or less extent in both forms of the disease.

The mucous membrane of the mouth is often somewhat red, dry, and tender for a longer or a shorter time (generally from one to three days), before the appearance of the exudation, and at the same time the papillæ of the tongue swell and become protuberant. Next the exudation shows itself in the form of small, whitish points, sometimes on the tongue first, and in other cases on the inside of the lips, whence it extends to the cheeks in idiopathic mild cases, and to the roof of the mouth, soft palate, pharynx, and œsophagus, in the grave symptomatic form. The points of false membrane first deposited rapidly increase in size and thickness, so that in from one to three or four days, they assume the form of large patches, or a continuous membrane, which covers the whole or a considerable portion of the cavity of the mouth. When the exudation is recent, it is thin, and its surface smooth; when, on the contrary, it has been longer deposited, it becomes thicker, and its surface is rough. It is at first of a milk-white or pearly hue, but when undisturbed assumes a grayish or yellowish color. It is soft in consistence, breaking down under the finger like cheese, and presenting no traces of organization to the naked eye. It adheres to the mucous membrane with considerable tenacity at first, but becomes looser after awhile, and is detached spontaneously at last without any lesion of the tissue beneath.

The foregoing description applies to the exudation as it appears to the unassisted eye. I pass next to give an account of the characters it presents, when subjected to microscopical examination. These are such as have induced several observers to assert that the deposit consists of a true cryptogamic growth. Dr. Berg (*Loc. cit.*) states that the white coating of the exudation consists of epithelium, thickened by the swelling of its constituent cells; from the epithelium there springs a parasitic fungus in greater or less quantity, so that the chief portion of a patch of aphthæ (thrush) is composed either of epithelium or else of the parasitic growth. Under a magnifying power of from 200 to 300 diameters, an aphthous crust is seen to consist of epithelial cells, with a more or less interweaved coat of fibres, and a variable number of spherical or oval cells, without any sign of exudation-corpuscles, but only a small quantity of molecular albuminous deposit. "We can often trace the successive development of these cells from a spherical one of the smallest size, to an oval cell, and thence to a filament; and we have no doubt ourselves that the smaller cells are sporules, out of whose development the larger oval cells are formed, and finally, the filaments in the same manner as has been observed in other fungoid growths of this nature." Numerous projecting fibrils are observed in the circumference of an aphthous crust when submitted to the microscope, but these are rendered infinitely more clear by a weak solution of potash, which dissolves the albumen, and renders the cells of the epithelium transparent, while, at the same time, it diminishes their intimate cohesion, and the network of vegetable fibres is more plainly seen. "These fibres are cylindrical, with sharply defined dark edges, and their centres are transparent in transmitted light; they are generally equal in thickness, but at times they are, as it were, knotted together, and divided by distinct walls of separation. . . . . . In their interior, these fibrils often exhibit nucleated cells; occasionally these are very numerous, and of small size, but at times they are larger. In their course the fibrils divide into numerous branches, whose diameter is not less than that of the original stem, and I have occasionally observed these ramifications to increase in thickness, at their free extremity, and to terminate in a club-shaped end with a species of cell. From the sides of the fibrils spring numerous sporules, forming a point of departure for new ramifications. . . . . . . Careful investigation has shown us that these cells are placed upon the sides of the fibrils, and in particular that they are congregated around the terminations of the latter. It must therefore be admitted that the cells and the fibrils are both constituent parts of one and the same organization. When this growth vegetates undisturbed, its fibrils penetrate between the layers of the epithelial cells, but do not extend deeper than the inferior layer, though they spread laterally in every direction. On the free surface of the epithelium, the ramifications rise above the surface, exhibiting at the same time an abundant fructification, which gives a yellowish hue to the exterior."

I regret very much that my limits are such as prevent me from giving some account of the various facts and arguments brought forward by Dr. Berg, to prove the truth of his opinion, that the exudation of thrush is a parasitic growth or vegetation, having the epithelium of the mucous membrane for its soil. I must refer the reader to the very interesting review of Dr. Berg's work, from which we have made the above quotations, and to the work of M. Bouchut on the diseases of new-born children, for further accounts of the cryptogamic theory of thrush.

Symptoms of the mild form of thrush.—This form is the one most frequently met with in private practice. It is mild in all its characters, and often presents no other symptoms than those connected with the mouth. These are *heat* and *dryness*, with *tenderness* of that part. The tenderness is shown by the child's crying and jerking the head backwards when the finger is introduced into the mouth, whereas in health the infant will almost always seize the finger and suck it with considerable force. It is shown also by the refusal to take the breast, or by the difficulty with which this is done, the child occasionally letting the nipple drop with a cry of pain, then seizing it again, and again letting go with fretting or screaming. In some of the cases there are various signs of disorder of the digestive tube, which are, however, seldom severe. They consist of slight diarrhœa, the stools being at first yellow, and afterwards green and acid, of occasional vomiting, of attacks of colicky pain, and sometimes of feverishness. To show how frequent is the occurrence of diarrhœa in thrush, and to prove also that it is not a necessary accompaniment of the disease, as has been supposed by some persons, I will quote the fact mentioned by Dr. Berg, that of 115 cases, in only 29 did the stools retain the normal yellow color throughout the whole course of the disease; while in the remaining 86 green evacuations appeared simultaneously with the invasion, or supervened at a later period. We may cite also the cases reported by MM. Trousseau and Delpech, of which only 14 out of 58 presented neither gastric nor intestinal complications.

The amount of exudation is generally small in this form, and it rarely extends behind the soft palate. The *duration* is usually between four and nineteen days, the average being about eight or twelve. The termination is almost always favorable.

Grave form.—It is under this form that the disease is most apt to occur in public institutions for children, and particularly in foundling hospitals. That it sometimes occurs also in private practice will not be doubted, I think, by any who will read with care the descriptions of the disease given by Underwood, Dewees, and Eberle. I have myself met with two fatal cases in private practice, which presented all the symptoms described by M. Valleix as characterizing those observed by him in the foundling's hospital at Paris, with the single exception of the ulcerations upon the internal malleoli. They were both children of parents who had every comfort at their command. One died at the age of four weeks, in consequence of the attempt to rear it on artificial diet. The other perished when six weeks old, apparently from some unhealthy condition of the mother's milk, which seems the more probable from the fact that the same mother had previously lost two children under precisely similar circumstances; all the children of this person were born vigorous and hearty, and did well for a short time, but soon after the birth, the nipples of the mother became dreadfully excoriated, the digestive organs of the infant began to give way, and death finally occurred with all the symptoms of fully-developed thrush. I can surmise now, though no examination was made at the time, that the cause of the disease was a continuance of colostrum granules in the mother's milk.

The most important *symptoms* of the grave form are the buccal *exudation*, various *abdominal* symptoms, particularly diarrhœa, vomiting, and colic, and more or less marked *fever*. The order of succession of the symptoms in severe thrush is not always the same. In most of the cases, the first symptom observed is probably diarrhœa, which is soon followed by fever, and in a few days by the appearance of the false membrane in the mouth. In a smaller number of instances the buccal exudation is the first symptom observed. The characters of the exudation are much the same as those observed in the mild form of the disease, except that the membrane is thicker, covers a larger portion of the mouth, and generally extends to the pharynx and œsophagus. In addition to the plastic deposit, there sometimes exist, especially in very bad cases, ulcerations upon the roof of the mouth, frænum linguæ, and gums. These are generally few in number, and either confined to the mucous tissue, or they may extend to the fibrous texture beneath; the surface upon which they rest is generally softened in consistence; their edges are irregular, soft, and of a whitish or reddish color. The heat of the mouth is not generally increased, except in very severe cases; the mouth is moist at first, but afterwards becomes very dry, and, from the refusal to suck the finger when it is introduced between the lips, and the difficulty with which the acts of suckling or feeding are performed, is evidently tender and painful.

The symptoms depending on the enteritic affection, are *tenderness* of the abdomen, *diarrhœa*, *vomiting*, and *fever*. The abdomen is usually distended by flatulent collections in the bowels, and is more or less painful to the touch, particularly in the right iliac fossa and epigastrium, and in severe cases over its whole extent. At the same time, the child evidently suffers from colicky pains, as shown by restlessness, by uneasy twisting movements of the trunk, by kicking of the limbs, and by crying, particularly just before, or at the moment of the evacuations. The appetite is usually diminished or entirely lost. The diarrhœa comes on gradually, the stools retaining their natural color at first, and being merely thinner and more frequent than natural. As the case progresses, they become more and more liquid and numerous, and almost invariably of a bright green color, and very acid. The green color of the discharges, and their highly acid condition, is noticed by all observers. *Vomiting* occurs in many of the cases, but is less frequent than diarrhœa. In some instances it is very obstinate and distressing, causing the rejection of whatever alimentary substances the child may take. Under these circumstances it has often been observed to coincide with the presence of a great deal of exudation upon the base of the tongue and soft palate, which has been supposed to act as its exciting cause. In other instances it is not so frequent, and as the matters ejected consist of greenish or yellowish bile, while at the same time the epigastrium is very sensible to pressure, this form of vomiting has been thought to depend upon gastritis.

Fever exists in most cases, from the time that diarrhœa makes its appearance, and sometimes at an earlier period. It is at first moderate, but as the case goes on, often becomes intense, the pulse rising gradually from 80 to 90, or 120, 140, and even 160. The *heat* of the surface, especially of the abdomen, is much increased, and accompanied by dryness. The feverish condition of the system is shown also by the restlessness and fretting of the child, and often by loud, frequent crying. When the exudation extends into the pharynx, the cry usually becomes hoarse and indistinct.

There are two other symptoms which occur in the course of thrush, about which some discussion has arisen. These are the appearance of an *erythematous redness* about the anus, and upon the buttocks, genitals, and upper parts of the thighs, and *ulcerations* upon the internal malleoli. The erythema is stated by M. Valleix to precede the other symptoms in the greater number of instances, whilst MM. Trousseau and Delpech deny the correctness of the assertion, and observed it to follow the diarrhœa in the majority of their cases. It seems to me that the latter authors are correct in ascribing the erythema to the irritation produced by the contact of the urine with the skin, which is predisposed, by the cachectic state of the constitution, to take on inflammation from causes which would not affect it in a healthy subject. The erythema is sometimes followed by papulæ, vesicles, blebs, and ulcerations, all of which probably depend upon the cause just referred to. The malleolar ulcerations are ascribed to the friction of the ankles against each other, a cause sufficient to produce such an effect in a broken down, diseased constitution, though insufficient in a healthy one. I may mention that I have seen the erythema frequently in private practice, but never the malleolar ulcerations.

During the acute period of the disease, the *strength* of the child is not much diminished, but as the case approaches its termination, if no favorable change takes place, the patient becomes weak and exhausted; the face assumes a pale and sallow look; the features are sharp and defined, and the eyes dull and surrounded by bluish circles. At the same time the whole body becomes emaciated, the skin loses its elasticity, and hangs in folds or wrinkles upon the limbs, and the surface assumes a dark and dingy hue.

As the fatal termination approaches, all restlessness ceases, and the child lies profoundly still, or only moves the mouth from time to time, or utters a faint cry; the diarrhœa diminishes, and the vomiting generally ceases; the pulse becomes very rapid and weak, the extremities cold, and death occurs in the midst of profound quiet, or after a few slight convulsive movements. The *duration* of this form of the disease is very uncertain. It is often less than that of the mild form, since many children die in the first five days after the appearance of the exudation. In other cases it is much longer, from a few weeks to two months. Relapses are not uncommon.

Before closing my remarks upon the symptoms, it is proper to state that the disease sometimes occurs at the termination of acute local affections, as pneumonia, bronchitis, or pleurisy, under which circumstances, there will be, in addition to the symptoms peculiar to thrush, those of the malady which preceded it.

NATURE OF THE DISEASE.—It is impossible, it seems to me, to determine, at present, whether thrush is, as M. Valleix asserts, a general disease, of which enteritis and the consequent buccal exudation are merely principal phenomena; whether, as MM. Guersant and Blache suppose, it is a superficial inflammation of the digestive mucous membrane, attended with a peculiar exudation as an effect; or whether, as supposed by Gruby, Bouchut, and Berg, it is a true cryptogamic or parasitic growth. Fortunately, the solution of the question is of no very great practical importance, as the causes of the disease, its phenomena, its prophylactic and curative treatment, are all ascertainable by careful observation, without a reference to either of these suppositions.

DIAGNOSIS.—The diagnosis of thrush is rarely difficult. Aphthæ differ from it in their vesicular nature during the formative stage, in the ulcerations which follow the vesicles, and in the absence of false membranes. From ulcero-membranous stomatitis it may be distinguished, by the formation in that disease of false membrane in layers from the beginning; by the presence of ulcerations; by the spongy, bleeding state of the gums; by the fetid breath; and by the absence of the abdominal symptoms which exist in thrush.

PROGNOSIS.—The prognosis must depend, in great measure, upon the circumstances under which the disease occurs. In private practice, and whenever the patients are suckled by their own mothers, or by healthy nurses, it is a mild affection. But in foundling hospitals, on the contrary, where the children are mostly brought up on hand, it is one of the most fatal maladies to which children are subject. The prognosis varies according to the form of the disease. The mild form is rarely fatal, while the grave form is fatal in the great majority of the cases.

To show the frightful severity of the disease under certain circumstances, I may mention that of 140 cases which occurred in the wards of M. Baron, at the Foundling's Hospital of Paris, only 29 recovered; while of 22 cases observed by M. Valleix, in the same hospital, but two recovered (Valleix, *Loc. cit.* p. 74). Again, M. Bouchut states that of 42 cases observed by himself, at the Necker Hospital, 14 were of the idiopathic (mild) form, all of which terminated favorably; and twenty-eight of the grave or symptomatic form, of which 20 died, and 8 left the hospital still laboring under the disease. Of the 20 fatal cases, 12 presented the lesions of chronic entero-colitis, 4 of acute entero-colitis, 3 of pneumonia, and 1 of hydrocephalus. It may be stated, in conclusion, that the danger is greatest in private practice, when the attack occurs in a child fed on artificial diet; when there is reason to suspect an unhealthy state of the nurse's milk; and in proportion to the extent and quantity of the exudation, its resistance to treatment, and the severity and obstinacy of the abdominal symptoms.

TREATMENT.—*Prophylactic Treatment.*—The most certain means of preventing thrush are evidently to procure for the child a full, healthy breast of milk, to give it a good habitation, to secure for it perfect cleanliness, and to attend properly to its clothing. When it is impossible, from any cause, to obtain a nurse for the child, the diet ought to be most carefully regulated as to quality, quantity, and times of administration. Careful attention to these points will, and I doubt not, have, greatly diminished the number and lessened the severity of the disease in private practice.

GENERAL TREATMENT.—It is clear that the successful management of thrush must depend much more upon judicious regulation of the hygiene of the child, than upon any therapeutical system that can be devised. The most frequent cause of the disease is, as we have seen, artificial diet, especially one in which milk is sparingly used or excluded, or an unhealthy state of the nurse's milk. It is reasonable to conclude, therefore, that attention to the removal or mitigation of these and other unfavorable hygienic conditions, constitutes the most important indications of treatment.

If a child who has been attacked with thrush is suckled exclusively, the milk of the nurse ought to be subjected to chemical and microscopic examination, and should it be found to present unhealthy characters, another nurse ought to be procured as soon as possible. In all such cases the nurse must pay strict attention to her diet, avoiding all articles which she knows or suspects to disagree with her, and all very rich dishes. Dewees recommends that she should abstain from most common vegetables, except rice, and from all kinds of liquors, especially the fermented.

When the disease occurs in a child who is nursed and fed alternately, and the remark about to be made applies still more appropriately to one fed entirely upon artificial diet, the most important remedy in the case is to procure a good wet-nurse. This is far better than any medical treatment that can be instituted. Often, however, this is impossible, and under such circumstances, the regulation of the diet ought to be attended to with the utmost care by the physician himself, who should specify its material, quantity, and mode of preparation.

The best substitutes for human milk are said to be goats' or asses' milk. But these can seldom be obtained in this country, and we are obliged, therefore, to resort to the milk of the cow. This should never be given pure to a child under two months of age. It ought always to be diluted with two parts, and if the digestive power be weakened by illness, with three, or even more, parts of water. It is very important to determine the quantity of food to be given the child in every twenty-four hours. From various inquiries and observations that I have made with a view to ascertain this point, I have been led to conclude that a healthy infant of two or three weeks old, will receive from a good nurse, and digest well, about a pint of milk in twenty-four hours. At the end of the first month, and in the course of the second, the quantity taken by the child increases gradually to about a pint and a half or a quart.

The data upon which I found these assertions are the following:—A woman whom I attended after her confinement, had a pint of milk by measurement drawn from her breasts daily by the nurse. I asked her how much she thought the child, a vigorous, hearty boy, took during the same time. Her reply was that, judging from the frequency and vigor with which he nursed, she was quite sure he took as much as was drawn by the nurse. I had another patient who lost her child in the birth, and who, desiring to go out as a wet-nurse, kept up her milk by means of a breast-pump. Six weeks after her confinement, I had all the milk she obtained in a period of twenty-four hours kept for my examination. It measured just a quart. I made very careful inquiries in regard to the point under consideration, of a very experienced and intelligent nurse, who had been constantly employed in this city for thirty years back. I desired her to answer me accurately two questions: 1. How much milk do you think a healthy mother gives to her child daily after the flow is fairly established? 2. What quantity of nourishment do you give in twenty-four hours to infants you are compelled to feed exclusively? The answer to the first question was that she had often drawn more than a pint from the breasts in the twenty-four hours, in addition to what a healthy child took, and that she had frequently taken as much as three pints from women who had lost their children. She supposed, therefore, that a hearty child would take during the first two weeks, at least a pint, and much more afterwards. To the second question she replied: that she usually gave to hearty children of one, two, and three weeks old, a pint of food in twenty-four hours.

We may, therefore, I think, assume as a general rule, that a healthy child, within the month, ought to take about a pint of nourishment in the time specified.

An infant laboring under thrush would scarcely take so much as this;

but if it take only half a pint or a gill in the day, it is clear that it cannot be expected to live long on so much less than its natural quantity. It ought to take, it seems to me, under these circumstances, about two or three tablespoonfuls of food every two or three hours, between morning and evening, and once or twice during the night, which would give it from eight to ten ounces in the day. The quantity must be regulated, however, by the condition of the infant, and particularly by the manner in which it takes the food, when offered. The child must never be forced to take more than it wants. The moment it seems to have had enough, the nurse should cease to offer any more.

Having determined the quantity, the preparation of the food must be attended to. The milk and water ought always to be prepared by boiling for two or three minutes, stirring all the time, after which it is to be moderately sweetened with white, and not brown sugar. If this is found to disagree with the stomach, which is to be inferred when it is always rejected by vomiting, and when considerable quantities of undigested curd are found in the stools, the diet must be changed. Under these circumstances we may try thin arrow-root or barley water, containing only a sixth part of milk; or cream and water, one part of the former to three, four, or five of the latter; or we may endeavor to obtain asses' or goats' milk, and use it diluted with an equal quantity of water instead of two-thirds.

I would recommend in these cases a diet which I have found to agree better with children deprived entirely of the breast, than any other that I have ever directed. I have employed it now in a great many instances, and believe it to be the best substitute for the natural aliment that I am acquainted with. It is made by dissolving a small quantity of prepared gelatine or Russian isinglass in water, to which is added milk, cream, and a little arrow-root, or any other farinaceous substance that may be preferred. The mode of preparation, and the proportions are as follows: a scruple of gelatine (or a piece two inches square of the flat cake in which it is sold) is soaked for a short time in cold water, and then boiled in half a pint of water until it dissolves,—about ten or fifteen minutes. To this is added, with constant stirring, and just at the termination of the boiling, the milk and arrow-root, the latter being previously mixed into a paste with a little cold water. After the addition of the milk and arrow-root, and just before the removal from the fire, the cream is poured in, and a moderate quantity of loaf sugar added. The proportions of milk, cream, and arrow-root, must depend on the age and digestive power of the child. For a healthy infant within the month, I usually direct from three to four ounces of milk, half an ounce to an ounce of cream, and a teaspoonful of arrow-root to a half pint of water. For older children, the quantity of milk and cream should be gradually increased to a half or two-thirds milk, and from one to two ounces of cream. I seldom increase the quantity of gelatine or arrow-root.

I have given this food to a great many children for some nine years past, as well to those brought up entirely on hand, as those partly suckled, or weaned, and can truly state that they have thriven better upon it than upon anything else that I have employed. In several cases it has agreed perfectly well with infants who could not without vomiting, diarrhœa, and colic, take plain milk and water, cream and water, any kind of farinaceous food prepared with water, chicken water, or in fact any other food that had been tried. In the cases of sick children, it ought sometimes to be made even weaker for a while, than in the proportions first mentioned above.

No general treatment is required in the simple idiopathic form of the disease beyond regulation of the diet, and the occasional use of warm baths. Local treatment will almost invariably suffice for the cure.

In the *grave form* of the disease, it is necessary, after regulating the diet, to employ remedies for the disordered condition of the alimentary canal. These should consist principally of alkalies, astringents, opiates, occasionally a dose of some laxative substance, nitrate of silver, and the external employment of baths, warm cataplasms to the abdomen, and sometimes of revulsives.

The *alkalies* usually employed are soda, lime-water, magnesia, chalk, and prepared crab's-eyes; of these, I prefer in most cases, the soda, lime-water, chalk, or crab's-eyes, to be given in the manner which will be recommended in the article on entero-colitis. Dewees recommends very highly the following formula:

℞.—Magnes. alb. ust., ...	gr. xii.
Tinct. thebaic., ...	gtt. iii.
Sacch. alb., ...	q. s.
Aquæ font., ...	℥i.—M.

A teaspoonful to be given every two hours until the bowels are tranquil.

He says of it that he has "long adopted it with entire success." In conjunction with the internal use of alkalies and astringents, I would recommend the practice pursued by M. Valleix, of employing *opiate enemata*, and warm *poultices* containing laudanum, applied upon the abdomen. The enemata should consist of one drop of laudanum in a tablespoonful of starch-water, for young infants, to be used morning and evening. The poultices may be made of Indian or flaxseed meal, placed between two pieces of soft gauze flannel, to be secured around the body by a band, and renewed from time to time.

Purgative remedies are much used in this country in all cases of intestinal disorder. I believe them to be unnecessary, and generally injurious, in thrush, except at the onset, and occasionally through the course of the disease, when we may suppose the bowels to contain accumulations of partially digested aliment, or highly irritating secretions. Under these circumstances, and only then, from half a teaspoonful to a teaspoonful of castor oil, or a teaspoonful of spiced syrup of rhubarb, containing half a drop of laudanum, may be prescribed, and repeated in case the same condition of things should recur. Once the diarrhœa with green watery stools established, I believe all cathartics to be, as a rule, injurious.

Opiates in moderate quantities, given in combination with alkalies or astringents, or used by injection or externally, are of the greatest service at all stages of the grave form of the disease. When the diarrhœa is severe and obstinate, and particularly when the stools contain mucus or blood, or are attended with tenesmic straining, nitrate of silver given internally, and used by injection, may be resorted to with very probable benefit. The doses and modes of administration will be described under the head of Entero-colitis.

Some authors recommend the application of one or two leeches to the margin of the anus, or over the left iliac fossa. I think they can rarely be proper, and if so, only in vigorous, hearty children, and in cases presenting strongly marked inflammatory symptoms. When the symptoms indicate great exhaustion, or tend towards a state of collapse, resort must be had to stimulants, of which the best are weak brandy and water, or a mixture of equal parts of wine-whey and arrow-root water.

LOCAL TREATMENT.—The local treatment is important in all cases, but is of much less consequence than the general treatment, and particularly attention to the diet and other hygienic conditions of the patient. Topical remedies undoubtedly have the effect, however, in some instances, of arresting the progress of the exudation, and hastening the resolution of the disease of the mouth; but I have uniformly found in grave cases, that no remedies applied to the mouth had any decided influence upon the abdominal disease, which is, after all, the cause of the fatal termination in the vast majority of cases. The local treatment ought, therefore, to be regarded as adjuvant only to the general management of the disorder.

In mild cases the most suitable local treatment, the one recommended by Underwood, Dewees, Eberle, and MM. Trousseau and Delpech, and that which I have generally employed, is the occasional application to the mouth of borax. It may be used mixed with an equal quantity of honey, and applied by means of a rag or pencil; or with an equal quantity or two parts of finely-powdered white sugar, of which a pinch is to be put upon the tongue every two or three hours; or in solution, in the proportion of a drachm to two ounces of water. The best mode probably is to mix it with honey. If this application fail to arrest the deposit of the exudation, we may resort to alum in powder or solution, or better still, to solutions of nitrate of silver, or to careful cauterization with the solid nitrate. The alum may be used in the same manner as borax, or according to the following formula, recommended by M. Valleix:

℞.—Aluminis, ...	gr. xv.
Mel. Rosæ, ...	ʒiiss.
Decoct. hordei, ...	℥iijss.—M.

In the use of the nitrate of silver, I should resort to a solution of five grains to the ounce of water; MM. Trousseau and Delpech, however, employ one of thirty grains to the half ounce, or more frequently cauterize lightly the whole mucous surface with the solid caustic.

Between the application of any of the above-mentioned remedies, the mouth of the infant ought to be occasionally moistened and cleansed with some of the mucilaginous solutions, as gum-water, flaxseed tea, or that made from sassafras pith, slippery elm bark, or marsh-mallow root.

Strict and careful attention must be constantly paid to the state of the skin around the anus, and upon the thighs and buttocks. These parts ought to be well cleansed after each evacuation of urine or stool, by gentle pressure, and not by rubbing, with a fine sponge dipped into tepid milk and water, then dried with a soft napkin in the same manner, and well anointed with simple cerate, or what I find better than anything else, Goulard's cerate. These precautions ought to be still more carefully observed if erythema has already made its appearance.

CHAPTER II.

DISEASES OF THE THROAT.

ARTICLE I.

SIMPLE OR ERYTHEMATOUS PHARYNGITIS.

Definition; Synonymes; Frequency.—Simple pharyngitis consists of an erythematous inflammation of the pharynx, tonsils, and soft palate, unaccompanied by ulceration, deposit of false membrane, or gangrene. It is not mentioned by Underwood. It is described under the title of cynanche tonsillaris by Dewees and Eberle, and of tonsillitis by Stewart and Condie. It is very frequent both as an idiopathic and secondary disease. I constantly meet with it in children of all ages during the cool months of the year.

Causes.—It may occur at all ages, and is equally common in the two sexes. It is more frequently a secondary than an idiopathic affection. The diseases in the course of which it is most apt to occur are scarlet fever and measles, and next pneumonia and bronchitis. It is often an accompaniment of simple laryngitis. The idiopathic form is most common in this city in the late winter and early spring months. It is said to prevail sometimes in an epidemic form.

The *exciting causes* of the disease are not always easily detected. In most instances, however, I believe that exposure to cold is the cause of the attack.

ANATOMICAL LESIONS.—In mild cases the alterations of texture observed during life, and in a few instances after death, the patient having died of some other disease, consist of greater or less redness, swelling, softening, and a rough or granular and sometimes œdematous condition of the mucous membrane covering the soft palate, tonsils, and pharynx. The uvula and tonsils are generally tumefied, and the crypts of the latter filled with mucous or purulent fluid of a yellowish color. In one very severe case which proved fatal, MM. Rilliet and Barthez found the tonsils very red, soft, only slightly swelled, and infiltrated with pus; the pharynx was covered with a thick layer of bloody mucus; the mucous membrane of the throat was of a dark red color, thickened, and granular, but not softened. The submaxillary glands were of a grayish color, enlarged and soft.

SYMPTOMS.—Simple pharyngitis of moderate severity begins with restlessness, irritability, fever, slight cough, and in some instances, pain in the throat, which is complained of by older children, and betrayed in those who are very young, by the refusal to nurse or take food, because of the difficulty of swallowing. The *face* is generally flushed, sometimes very deeply so. Young children are often drowsy, but from irritability and fever refuse to sleep except on the lap. The *fever* is marked by acceleration of the pulse, which rises to 100, 110, or more in children over five years of age, and to 120, 130, or 140 in those under that age, and by unusual warmth or even heat of the skin. At the same time the *respiration* is generally more frequent than natural, but almost always regular; in cases attended with high fever, I have counted the breathing at 42 and 50. *Auscultation* reveals pure vesicular murmur or slight sibilant rhonchus. The *voice* is clear, or, in rather severer cases, obscured and nasal, and in some instances, speaking is painful and difficult. *Cough* is a frequent symptom. It was present in 20 of 25 cases observed by myself. In 6 of these it was harsh and croupal, so that the children seemed threatened with croup. The croupal sound seldom lasted over one night, after which the cough was merely hoarse, and gradually became loose towards the termination of the attack. In the remaining cases it was rare and dry in the beginning, and more frequent and looser as the disease progressed. *Pain* is a frequent, but far from constant symptom at the onset of the disease. It generally exists during deglutition. When present it is shown in infants, as stated, by their refusing the breast, or nursing only at long intervals, and with difficulty; while in older children it is complained of. It is not, however, a constant symptom, as I have often seen children of one, two, and three years old, with severe angina productive of violent fever, who swallowed fluids and soft solids without a sign of pain. Of 22 cases in which the state of this symptom was particularly noticed by myself, it was present only in 7. Throughout the acute period of the disease there is generally considerable *thirst;* the *appetite* is diminished or entirely suppressed; the *stools* are usually natural, or there is slight constipation.

The throat should always be examined when there is the least reason to suspect that an attack of sickness depends upon inflammation of that part, and whenever a child has been seized suddenly with fever, particularly in cold weather, and there is nothing more evident by which to explain the illness. To examine this part well, the tongue must be strongly depressed with the handle of a spoon, which should be carried back to the base of the tongue. This may be done in the youngest infant.

The *appearances* presented by the throat are as follows:—the soft palate, uvula, tonsils, and generally the pharynx also, are more or less reddened and swelled, and the mucous membrane commonly looks rough and granular. The fauces are often filled with frothy mucus, and in severe cases, coated all over with mucous or purulent secretions, which sometimes line the inflamed surfaces in such a way as to resemble false membranes. They are to be distinguished only by careful examination, and by removing a small portion on a pencil or sponge mop, in order to ascertain their real nature. I have seen the mild form of inflammation in a child ten days old, in one eight weeks, another three months, and a fourth nine months old.

The *sub-maxillary glands* and neighboring cellular tissue are sometimes swollen, in consequence of the extension of the inflammation to them. This is often evident to the eye, but is more correctly judged of by the touch. At the same time the glands are usually somewhat painful to the touch. The amount of swelling is slight in very mild cases, or there may be none at all. In severer cases it is much more considerable.

The *breath* is said to be often fetid. I have not met with this character in the simple disease. *Expectoration* is rarely present. I have never noticed it under six years of age. Slight *nervous symptoms* occur in nearly all the cases, consisting, as already stated, of restlessness and irritability in mild attacks, and of insomnia or drowsiness, with starting and twitching, in those which are more severe.

The fever generally occurs at first only in the after part of the day and during the night, often becoming intense at that time, with restlessness and starting, and subsiding or disappearing entirely towards morning, to recur again the next afternoon or evening. Children not unfrequently play about all the early part of the day, and are attacked with the symptoms just mentioned, as night comes on. The disease generally pursues this course for three or four days, and then passes away entirely, or, if it lasts beyond that time, the fever becomes continued, and the attack runs on for seven, eight, or ten days.

In *grave* cases of simple angina, the disease begins with *vomiting, fever,* and severe *nervous symptoms,* in the shape of excessive restlessness, or somnolence, and occasionally convulsions. The fever is violent, the pulse being very frequent and full, and the skin hot and flushed. The intense heat and flushing of the skin, which in sanguine children sometimes affects the greater part of the surface of the body, together with the activity of the circulation, not unfrequently make the onset of the disease resemble very closely that of scarlet fever. Four cases of this kind that have come under my notice presented severe nervous symptoms at the invasion. In a girl between two and three years old, they consisted of wildness and ecstatic expression of the face, and trembling uncertain movements of the limbs, which would probably have terminated in convulsions, but for the timely interposition of a warm bath. In the three others, general convulsions occurred. Two of the subjects in which convulsions took place were between five and six years old, and one between three and four. In two the convulsions occurred at the onset, and in a third on the second day. The convulsive movements lasted from ten to twenty minutes, and were followed by somnolence for a few hours in two, and by stupor for a day in the third. It should be stated, however, that two of these subjects were predisposed by constitution and temperament to spasmodic attacks, as one had had a fit previously from a similar cause, and the other two from difficult dentition. The third had never suffered from any symptoms of the kind, and did not appear predisposed to them.

The *tongue* is generally dry and coated with a thick whitish fur in grave cases; the *respiration* is quick, loud, and nasal; and the *voice* guttural or nasal, and difficult. There is usually extreme *thirst,* and not unfrequently delirium. The throat is commonly violently inflamed, of a deep red color, and coated over with mucous or purulent secretions. The submaxillary regions are often swelled, and the deglutition sometimes, though not always, difficult. When the disease proves fatal, the different symptoms soon reach their height, and death may occur in two or three days. I have never, however, known simple pharyngitis to terminate fatally. The *duration* of the grave cases is variable. In the four that I have noted, it was between three and eight days.

Secondary pharyngitis, which, as has been stated, is a very frequent disease, will be treated of in the articles on the various diseases in the course of which it occurs.

DIAGNOSIS.—The diagnosis of simple pharyngitis is not always without difficulty, as there are no local symptoms in two-thirds of the cases at the invasion, nor in some instances at any period of the attack. The physician and attendants, therefore, are often deceived as to the real cause of the violent fever which has so suddenly made its appearance, and are disposed to refer it to any but the true one.

It has happened to me several times in cases of children attacked with simple angina, to suspect pneumonia from the sudden occurrence of fever, rapid respiration, slight dry cough, and the absence of pain in the throat, difficulty of deglutition, or other symptoms to call my attention to the real seat of disease. The diagnosis is to be corrected only by the absence of the physical signs of pneumonia, and the consequent necessity of finding some other cause of the sickness. Angina may be mistaken also for indigestion, which is one of the most frequent causes of sudden fever in childhood, and is accompanied like severe angina by vomiting. The distinction between the two is to be made by careful inquiry as to the history of the attack, by examination of the matters ejected from the stomach, and by inspection of the throat. Severe cases, particularly when ushered in by convulsions, may be mistaken for disorder of the nervous system dependent upon dentition. The only method of ascertaining the truth is again the inspection of the throat. Cases of this kind might also be mistaken for the beginning of scarlet fever. Time only, and the development or absence of the symptoms peculiar to the latter disease, could enable us to determine the diagnosis.

The diagnosis between simple and pseudo-membranous pharyngitis will be given under the head of the latter disease.

PROGNOSIS.—Simple pharyngitis of moderate severity is very rarely, if ever, a fatal disease. Severe or grave erythematous pharyngitis, on the contrary, is often a dangerous malady. The four cases that have come under my care, however, all recovered. The unfavorable symptoms in such cases are: very violent fever, greatly altered physiognomy, difficult respiration, choked and guttural voice, excessive jactitation, delirium, convulsions, and coma.

TREATMENT.—Mild cases of simple angina need but little treatment. The child ought to be confined to a warm room in all cases, and kept in bed, or on the lap, if it have fever. The diet must be restricted to milk preparations and bread, so long as the fever continues. The therapeutical part of the treatment may consist in the use of some mild evacuant, as one or two teaspoonfuls of castor-oil, half a teaspoonful or a teaspoonful of magnesia, a small quantity of syrup of rhubarb, or what is all-sufficient in many cases, a simple enema. At the same time we may give, if the frequency of pulse, heat of skin, and restlessness be considerable, a few doses of sweet spirits of nitre, or spiritus Mindereri, alone, or combined with from one to four drops of antimonial wine, according to the age. A warm bath, if the child is not afraid of it, is an admirable remedy when there is much excitement of the circulation; or a foot-bath, containing salt or mustard, may be used.

Frictions over the throat and neck are often very advantageous; they may be made with hartshorn and sweet oil, with or without the addition of laudanum, or a small quantity of spirits of turpentine may be applied upon the skin, so as to produce slight counter-irritation. When there is much pain and difficulty of deglutition, the case is best treated by the use of nitrate of silver in solution (5 or 10 grains to the ounce), or of powdered alum, applied by means of a large throat-brush.

In the *severe form* of the disease the treatment must be much more active than in mild cases. When the fever is very high, and threatening nervous symptoms are present, the most speedy means of controlling them is a warm bath, continued for fifteen or twenty minutes. If the effects of this should be but slight or transitory, bloodletting must be resorted to. In a very young child the proper means of taking blood is by the application of a few leeches behind the angles of the jaw; in those who are older, on the contrary, a venesection of from two to four ounces is much better, because at that age the dread of leeches is so great, that the fright and consequent resistance on the part of the child, is always a serious, and in some cases an insuperable objection to their use. Some evacuant dose should be given early in the attack; it may consist of castor oil, magnesia, epsom salts dissolved in lemonade, fluid extract of senna, or infusion of senna and manna. The quantity must be sufficient to produce several copious stools, and should it fail to operate in three or four hours, and the fever continue, it is always well to assist it by means of a purgative enema. Two hours after the exhibition of the cathartic, it will be proper to resort to small doses of antimonial wine or tartar emetic solution, with nitre, repeated every hour and a half or two hours, in the manner recommended in the article on pneumonia. If the secretions into the fauces be very abundant and tenacious, so as to impede respiration, the best means of getting rid of them is by an emetic of ipecacuanha, hive syrup, or antimonial wine. If they collect again, the throat ought to be cleansed from time to time with a small sponge-mop. The inflamed surfaces should be touched two or three times a day with a solution of nitrate of silver (from five to ten grains to the ounce). My father has been in the habit of employing with much benefit, in the severe angina of children, whether idiopathic or secondary, a wash made according to the following formula:

℞.—Cupri Sulphat.,
Quiniæ Sulphat., ... āā gr. vi.
Aquæ Destillatæ, ... ℥i.—M.

This is applied in the same way as the lunar caustic solution, and I have frequently seen it produce most excellent effects.

The four grave cases observed by myself recovered under very simple treatment. This consisted in the use of the warm bath; of doses of castor oil to move the bowels freely on the first day, and of syrup of rhubarb or enemata afterwards to keep them soluble; of doses of antimonial wine and nitre every two hours in such quantity as to avoid sickness; of mustard foot-baths; stimulating frictions to the outside of the throat; applications of lunar caustic solution to the throat internally, three or four times a day; and of rigid diet. In one case the warm bath was used three times in a single day, because of the extreme restlessness and heat of skin, and was productive each time of much benefit.

ARTICLE II.

PSEUDO-MEMBRANOUS PHARYNGITIS.

DEFINITION; SYNONYMES; FREQUENCY.—Pseudo-membranous pharyngitis consists in a peculiar form of inflammation of the pharynx, in which the inflammation is attended with an exudation of false membrane upon the mucous tissue.

It is the disease called by older writers angina maligna or gangrenosa, cynanche maligna, etc. In this country it is popularly known by the name of putrid sore throat. It is designated angina suffocativa, or sore throat distemper, by Dr. Sam. Bard, of New York, whose paper (*Trans. Am. Philos. Soc.* vol. i) is the best of the early productions upon the subject. It is the *diphtherite* of M. Bretonneau. Underwood and Dewees make no mention of it. Eberle, in his chapter on tonsillitis, confounds it with simple angina; but it is evident that he had met with the disease, from the fact of his remarking that flakes of coagulable lymph, resembling superficial sloughs, sometimes adhere to the inflamed tonsils, and that the inflammation passes down into the larynx in some instances. Dr. Condie describes it under the title of pseudo-membranous or diphtheritic inflammation of the throat.

It is difficult to arrive at a correct appreciation as to its frequency. It may be stated, however, that it is rare as a sporadic affection, while it sometimes prevails to a considerable extent as an epidemic disease.

CAUSES.—It occurs both in the sporadic and epidemic forms. M. Guersant states that it is to be met with in Paris at all seasons, and under all temperatures. It is strongly disposed, however, to assume the epidemic form, and may then prevail over districts of greater or less extent.

It has been thought by many to be propagated by direct *contagion*. Such is the clearly expressed opinion of MM. Trousseau (*Dict. de Méd.*, t. x, p. 393), Valleix (*Guide du Méd. Prat.*, t. iv, p. 350), and Guersant (*Dict. de Méd.*, t. iii, p. 128–129). M. Bretonneau (*Traité de la*

Diphthérite), is strongly disposed to the same opinion, without, however, positively adopting it. MM. Rilliet and Barthez are fully convinced that the disease is contagious. I have seen enough in my own practice to convince me that it is either directly contagious, or that it may become epidemic in a household, like influenza, to an extent sufficient to cause its spread from one member of the family to another. On one occasion a boy two years and a half old was attacked with the disease, while his sister, an older child, was already dangerously ill with it. In a second instance of a family of three young children, two were attacked simultaneously with the disease, and in both it ended in fatal croup. The third child remained well for a few days after the termination of these cases. It, also, was then attacked. The disease extended to the larynx, and the child was saved only by the operation of tracheotomy. In two other families, a second case occurred in from five days to a week after the commencement of the first case. In a fifth instance, the father was attacked ten days after being exposed to a very bad attack which had nearly carried off his young daughter. On the other hand, I have met with much more numerous instances in which other children were allowed free access to the sick room without any extension of the disease. Dr. Geddings, of South Carolina, in a valuable monograph on "pseudo-membranous inflammation of the throat" (*Am. Jour. Med. Sci.* vol. xxiv, p. 82), says that diphtheritis depends on an epidemic constitution of the atmosphere, but that "under particular circumstances, as when many persons are crowded together, when ventilation is imperfect and cleanliness is neglected, there can be no question of the generation of a contagious influence, capable of transmitting the disease from one person to another." Dr. Bard (*Loc. cit.*), states that the disease was of an "infectious nature," and that the infection depended not so "much on any generally prevailing disposition of the air, as upon effluvia received from the breath of infected persons. This will account why the disorder should go through a whole family, and not affect the next-door neighbor; and hence we learn a very useful lesson, namely, to remove all the young children in a family, as soon as any one is taken with the disease; by which caution, I am convinced, many lives have been, and may again be preserved." It is said to be most frequent between the ages of 2 and 8 years, and to be more common in boys than girls. Of 38 cases that I have seen, 22 occurred between the ages of 3 and 8 years, to wit, 5 between 3 and 4; 7 between 5 and 6; 3 between 6 and 7; and 6 between 7 and 8. Only 2 occurred between 2 and 3 years of age; and 1 between 1 and 2. Of the 38 cases, 25 occurred in girls, and but 13 in boys. It is said that children of feeble constitution, and those subjected to bad hygienic conditions, or debilitated by severe illness, are particularly exposed to it, especially in the sporadic form.

The secondary form occurs most frequently as a complication first of scarlet fever, and then of typhoid fever and measles.

ANATOMICAL LESIONS.—The false membranes covering the pharynx, soft palate, and tonsils, are of a yellowish-white or grayish color, of rather tough consistence, and of variable thickness. They may consist of one or several layers, and they adhere with moderate tenacity to the mucous membrane. They are sometimes ash-colored, and being softened by the pharyngeal secretions and tinged with blood, which latter is often exuded from the mucous tissue in diphtheritic inflammation, they have, under these circumstances, been frequently mistaken for sloughs of the mucous membrane, thus giving rise to the old titles of angina gangrenosa, putrid sore throat, etc. The *mucous membrane* is generally injected and red, and often presents ecchymosed spots. In some cases it is softened and roughened, or even deeply ulcerated, so that the false membrane may rest upon the muscular tisue of the pharynx. The ulcerations, though rare in the primary, are not uncommon in the secondary form. The *submaxillary* glands are almost always enlarged, but are seldom found in a state of suppuration.

In the secondary form of the disease, the mucous membrane is more violently inflamed. It is of a deep red color, rough, and very much thickened and softened. The tonsils are large and soft, uneven, and often infiltrated with pus. It is not unusual in this form, to meet with ulcerations of the mucous membrane. False membranes are almost always present; generally on different portions of the fauces, and more rarely over their whole extent. They are generally rather soft and thin, of a whitish, grayish, or yellow color, dispersed in fragments, and easily torn. The inflamed parts are usually bathed in purulent fluid. The submaxillary glands are large, red, and soft.

SYMPTOMS; DURATION.—The disease begins usually, but not in all cases, with fever. The strength and appetite are not much disturbed at first, but, as the attack progresses, the former is diminished and the latter suppressed; the thirst remains natural. There is at the same time, in some, but not all cases, pain in the throat, which may or may not be accompanied by difficulty of deglutition. Both these symptoms are, however, often very slight, or they may be entirely wanting, a fact with which the practitioner ought to be well acquainted, as the absence of local symptoms by which to explain the cause of the sickness, gives to the disease, in some instances, a remarkably insidious character which may well mislead. In one fatal case at three years of age that came under my notice, there were neither complaints of pain, nor difficulty of swallowing, so that the parents had not the least suspicion of the throat being the seat of disease, though I found it violently inflamed, and covered with deposits of thick false membrane in points. On another occasion I was sent for to see two children who had been sick for four days with slight fever, languor, and loss of appetite, but who were not thought to be seriously ill. I found them laboring under extensive membranous angina with the early symptoms of croup. They both died a few days later of croup. I attended a few years since, for three days in succession, a boy who was attacked suddenly with vomiting and slight fever, loss of appetite and languor, and whom I supposed to be suffering from mere gastric irritation. His only local symptom was pain in the *chin*, and this was not reported to me until afterwards. The mother chanced to look into his throat, and finding there some whitish spots, sent me word. I found him with very considerable membranous exudation, which was fortunately prevented from extending into the larynx by proper treatment. Twice, lately, have I been sent for to see children attacked with croup, and, on finding the fauces thickly covered with exudation, have been told that the patient had been ailing for near a week before with languor, slight peevishness, loss of appetite, and some little pain in the throat. The symptoms, prior to the development of the croup, had been so mild in both cases as to cause no alarm, and yet the anginose disease had evidently been progressing insidiously for several days. To this point,—the strangely insidious character of the anginose symptoms in the early stage,—I cannot too strongly invite the attention of the reader. It is one of the very greatest importance, since at that time, above all others, ought the case to be placed under proper treatment.

If the throat be examined on the first day of fever, the exudation may often be found even at that time, though it is sometimes not formed before the second day. The fauces generally present slight swelling and redness prior to the appearance of the false membrane, which almost always shows itself first on one of the tonsils only, in the form of whitish or opaline spots like coagulated mucus, which soon run together and extend over the whole gland, and then to the soft palate and pharynx, though it sometimes remains limited to the tonsils and soft palate. A little later in the attack the plastic deposit exists in the form of layers of greater or less extent; it has lost its transparency, become firmer in consistence, thicker, and changes from a white to a yellowish-white or lardaceous and sometimes grayish color. The submaxillary glands are almost always enlarged and slightly painful to the touch about three or four days after the appearance of the pseudo-membrane. The breath is offensive but not fetid. When this form of the disease, which is the one most frequently observed, is left to pursue its natural course in favorable cases, the pseudo-membrane becomes thinner, assumes a grayish tint, and falls off about the sixth or seventh day. When, on the contrary, topical remedies are applied to the throat, the membrane is often detached after one, two, or three days, but may be reproduced several times before the conclusion of the case. In unfavorable cases, on the contrary, even though the exudation may disappear more or less completely from the pharynx, it extends downwards into the larynx, and we have true croup developed, which, but too often, proves fatal in spite of all remedies.

In another and more violent form of the disease, the pseudo-membrane, about the time that it begins to be detached, assumes a grayish or blackish color, and hangs in shreds from the surfaces to which it was attached. The fauces, under these circumstances, present a gangrenous aspect, the mucous membrane having an appearance as though it were falling off in sloughs; the breath is extremely fetid, and there is more or less abundant salivation, or in some cases an expuition of sanguinolent fluid. There can be no doubt that it was from misconception of such cases as these, that the titles of gangrenous and putrid sore throat arose.

As the exudation disappears from the pharynx, the swelling of the parts affected gradually subsides. The mucous membrane, from which the plastic deposit has just fallen, is more or less injected and red; the tonsils and soft palate are sometimes found to be reduced below their natural size.

The *general symptoms* of pseudo-membranous pharyngitis are often slight, as has already been stated in a preceding paragraph, compared with the dangerous character of the local affection. There is generally but little *fever*, attended with very moderate heat of skin during the first few days, after which it often increases and the skin becomes hot and dry, though, not unfrequently, these symptoms are but slightly marked throughout the attack. In other cases, on the contrary, the fever is much more violent during the first day or two, but usually subsides soon; in some, however, it remains intense, and in a few observed by myself, the pulse was full and frequent and the heat very great after the second day. The principal symptoms connected with the *digestive organs* are loss of appetite and moderate thirst. These are not generally present in the beginning, but make their appearance a few days after the invasion. Vomiting is rare and the stools are normal.

The voice is commonly obscured and nasal, but not hoarse nor whispering, unless the disease extend into the larynx, in which case the symptoms will be those of true croup, as already described. *Cough* sometimes exists, but it usually resembles in sound that produced by the action of hawking rather than a common cough, and is altogether different from the tone of the cough of laryngitis.

The only other symptoms which require mention are the presence of more or less marked languor, depression, and loss of strength.

The pharyngeal inflammation and exudation frequently exhibit a strong tendency to extend to the larynx, and it is this which usually causes the fatal termination. It is safest for the practitioner always to suppose that the disease tends to attack the larynx, for such is undoubtedly its true tendency, and this it is that constitutes the chief danger of the disease. At other times they spread to the nasal passages, and thereby add greatly to the danger of the case. Again; the false membranes are formed in some rare cases upon different portions of the general integument, particularly upon the alæ nasi, behind the ears, about the anus, vulva, and nipples, and upon a blistered or any excoriated surface.

The *duration* of the disease, independent of complications, is usually about seven, eight, or nine days. If it extend into the air-passages very soon after the invasion, it may cause death within a few days. In most of the cases, however, the larynx does not become implicated under five or six days. In one of my cases death occurred on the fourth day, in one on the fifth, in one on the sixth, in two on the seventh, and in one on the eighth. In all but one the fatal termination was caused by the extension of the exudation to the larynx. In the exceptional case it was caused by the malignancy of the attack, and by enormous swelling of the glands and of all the tissues about the lower jaw and under the throat. Bard says that of seven deaths, five occurred before the fifth, and two about the eighth day.

Diagnosis.—It has already been stated that the disease sometimes begins with but faintly-marked local symptoms, and with general symptoms of so mild a character, as that it shall run on to a dangerous extent, before the attendants of the child became alarmed in regard to the condition of the patient, and without their suspecting even, in one instance, the true seat of the disorder. The diagnosis can present no difficulties to the physician, if only he examine the throat, but it is very possible, and I suspect often happens, that, when there are no complaints of pain in the throat, and no marked difficulty in swallowing, his attention may be directed, as occurred to myself, towards some other part of the body; he may neglect to look into the fauces, and the disease may thus pass unperceived for the first few days. The presence of any swelling of the lymphatic glands under the jaw, embarrassed movements of the neck, and the absence of other causes to explain the sickness of the child, ought, however, always to lead to an inspection of the fauces, and this would, in an instant, reveal the true character of the attack.

The distinction between simple and pseudo-membranous angina can only be made out during the existence of the pharyngeal exudation, as the symptoms of the latter disease are nearly identical with those of the former, before the deposit and after the fall of the false membranes.

Prognosis.—If the disease remains limited to the pharynx, it is almost always a very curable affection. When, on the contrary, it extends to the nasal passages, the prognosis is more unfavorable, and when the larynx becomes implicated, the prognosis is exceedingly grave; if the disposition to the production of false membrane spread to the skin, rectum, or vulva, the prognosis is also very grave, and death generally occurs in a state of profound adynamia. Of 38 cases that I have seen, 6 proved fatal. In 5 of the 6, death was caused by the extension of the disease into the larynx, and the consequent production of croup. In the other case, the fatal event occurred early, and apparently from the great malignancy of the attack, and from enormous swelling about the jaw and neck. In 9 other cases, the exudation also implicated the larynx, and caused severe croup, but they all recovered. In 14 cases therefore, of the 88, croup followed the anginose disease, and of these 5 died.

TREATMENT.—The treatment may be usefully considered under two heads, the *local* and *general*. It is now generally supposed that the former is more important than the latter, though, for my own part, I am convinced that they are at least of equal consequence. The great object to be held in view, is to prevent, if possible, the extension of the pseudo-membrane from the fauces into the larynx and nasal passages.

Local treatment.—The most important of the local remedies are the nitrate of silver and muriatic acid. These are the two remedies most highly recommended by MM. Bretonneau, Valleix, Grisolle, and Rilliet and Barthez. Dr. Geddings (*Loc. cit.*) speaks very highly of the success of the caustic treatment in his hands, in the epidemic which occurred in Charleston during 1837 and 1838. He employed either the nitrate of silver or muriatic acid.

The nitrate of silver is employed in solution or substance. The latter form is objected to by many on account of the risk of its slipping from the port-caustic into the pharynx, and thence passing into the stomach. The solution is therefore generally preferred. M. Bretonneau employs it in the proportion of half an ounce of the nitrate to an ounce and a half of water. The strength of the solution is very different as recommended by different authorities, some proposing a saturated one, and others one of from a drachm to ten grains of the salt to the ounce of water. I have usually made use myself of one of twenty grains to the ounce, and have found it abundantly strong for my purposes. It may be applied either by means of a piece of sponge fastened upon a proper handle, which is the best method, or a camel's hair pencil, nearly as large as the end of the little finger. The application should be made once, twice, or even three times, in the course of the twenty-four hours. Dr. Geddings recommends, when it is desirable to use the solid nitrate, to reduce it to powder, and to roll the sponge probang, previously moistened with mucilage of gum arabic and squeezed, in the powder, until a sufficient quantity adheres, and to apply it thus prepared to the diseased parts.

The muriatic acid is employed by M. Bretonneau either pure or mixed with honey. When the limits of the pseudo-membrane can be seen in the pharynx, he uses the concentrated acid, and carrying the sponge, after it has been dipped into the acid, and squeezed so as to be merely moistened, rapidly into the pharynx, he cauterizes lightly and withdraws it. When, on the contrary, the limits of the membrane cannot be seen, he dilutes the acid with an equal quantity of honey, and leaving more of it on the sponge than in the previous case, he recommends that the latter be passed down over the glottis, and then pressed against the base of the tongue, by raising strongly the handle to which it is tied, in order to express a few drops upon the mucous lining of the larynx. The cauterization is to be performed once or twice a day according to the necessity of the case. For children under ten years of age, the sponge ought to be about half as large as a pigeon's egg. The sponge is to be fastened to a piece of flexible whalebone, by making a crucial incision into it, introducing into this the end of the whalebone, and securing it with good sealing-wax, which is not acted upon by the acid as any ligature would be. When about to be used the whalebone is warmed and curved into such a shape as will allow it to pass into the pharynx without touching the roof of the mouth. M. Valleix proposes that the sponge should be fastened to the whalebone with waxed thread, and this to be covered with sealing-wax, to preserve it from the action of the acid. This would certainly be safer than the mere wax itself.

Applications of powdered alum and chloride of lime are recommended by writers of high authority. In slight cases, in which the disease shows but little disposition to extend, such applications may answer very well, but when the attack is threatening, and especially when the exudation is spreading, we should neglect all minor remedies of this kind, and resort at once either to lunar caustic or muriatic acid. If, however, the powders are employed, they may be applied by means of a throat-brush, or by causing a sufficient quantity to adhere to the forefinger of the right hand, and conveying it upon this to the diseased surfaces.

There is no real difficulty in making use of any of these applications, if the children be properly managed. One or two assistants must hold the patient in such a way that the head shall be thrown backwards, and the hands and feet secured. The physician must depress the tongue with the handle of a spoon held in the left hand, while he holds in the right the pencil or sponge-mop. If the child refuse to open the mouth, it can generally be made to do so by holding the nose in order to force it to breathe through the mouth. If this fail, all that is necessary is to press the handle of the spoon against the teeth, when the patient will soon become too much fatigued to offer further resistance.

GENERAL TREATMENT.—*Bloodletting* may be resorted to with advantage very early in the attack, if the child is vigorous and strong, the fever violent, and if there are no signs of prostration. When, on the contrary, the case is not seen within the first two or three days, depletion can seldom be resorted to with safety. By some it is proscribed entirely in the treatment of the disease. Thus M. Valleix (*Loc. cit.* t. iv, p. 369) says: "I will merely state that there is not a single case on record in which the disease was evidently arrested by *antiphlogistic* treatment, however energetic it may have been." I believe, however, that I once saw the disease arrested by depletion. During the last week of October, 1845, my father and myself were in attendance upon a girl five years of age, laboring under a most violent attack of the disease, which had extended into the larynx, and which, for several days exposed her life to the most imminent hazard. During the extremity of her illness, her brother, a fine hearty boy, two years and a half old, was taken sick in the evening of one day with considerable fever. On the following day, my father found the fauces very much inflamed, while at the same time there were patches of pseudo-membrane on each tonsil, and high febrile reaction. The boy was bled at once to four ounces. Four grains of calomel were given, and a few hours afterwards a dose of purgative medicine. The throat was touched with a solution of nitrate of silver, of ten grains to the ounce. The exudation was arrested at this point, though the fever continued for two days longer. It may be said that the nitrate of silver arrested the disease, but the solution was not a caustic one, and therefore hardly likely, it seems to me, to have produced, by itself, so powerful an effect. I am disposed to believe, from my own experience in this and other cases, that when resorted to early, and in vigorous subjects, it is a highly important and powerful remedy. I have employed it, on the contrary, later in the disease, without any good effects, and should, under such circumstances, depend on the local treatment, and the employment of mercurials.

Mercury.—The preparations of mercury are undoubtedly those which are most powerful in causing the dissolution and absorption of the pseudo-membrane. MM. Rilliet and Barthez remark, that so long as the disease remains confined to the pharynx, there is but little danger attendant upon it, and it would be unnecessary, therefore, to resort to so powerful an agent as mercury in such cases. This was, at one time, my own opinion also, but since I have seen more of the disease, and have observed its great tendency to spread to the larynx, I make use, in all cases of any severity at all, of mercury, not choosing to trust the disease until I perceive that it has ceased to spread. So long as the fever continues, and the exudation continues to be formed, I prefer to use the mercurial, as the most reliable and certain means of preventing that unhappy catastrophe, the formation of croup. The preparation generally made use of, and the one I always employ, is calomel, which may be given in the dose of half a grain or a grain every two hours, until the disease appears to yield, or until some of the effects of the remedy on the constitution are visible.

Having found of late years that antiphlogistic remedies, as a class, are very successful in preventing the spread of the exudation, I always combine the calomel with nitrate of potash and Dover's powder, or one of the antimonial preparations. My usual prescription is the following:

℞.—Hydrarg. Chlor. Mit., ... gr. vi.
Antimon. Sulphuret. Præcip., . . . gr. i, vel ii.
Potass. Nitrat., ... gr. xxiv.—M.
In Chart. No. xii.
One every two hours.

When the patient is restless or irritable, and when there is any tendency to diarrhœa, I combine with the above from three to six grains of Dover's powder, according to the age of the patient.

In very mild cases, in which the amount of exudation is small, and there appears no disposition to its spread, I sometimes depend entirely on the local treatment, and on the internal use of small doses of tartar emetic, as twentieths or thirtieths of a grain every hour or two hours, or from two to four drops of antimonial wine with ten or fifteen of sweet spirits of nitre, given every two hours.

In addition to the local and general treatment above recommended, I strongly advise that the patient should be rigorously confined to bed during the whole treatment, and for at least ten days after the disappearance of the exudation. I have twice known the exudation to reappear a second time, when the patient has been allowed to leave the bed at too early a period, and in one of these the exudation extended into the windpipe on the occasion of the second attack, in spite of all that could be done, and life was saved only by the operation of tracheotomy.

Emetics.—Purgatives.—Emetics are useful when the exudation shows a disposition to extend to the larynx, or when there is much difficulty of breathing from tumefaction of the fauces, or from accumulations of the pseudo-membranous deposits. I would recommend under these circumstances the use of alum in the manner proposed in the article on pseudo-membranous laryngitis. If this be not employed, ipecacuanha or tartar emetic ought to be resorted to. The emetic may be repeated in six or twelve hours, if the same indication should continue or recur. A purgative dose is useful at the commencement of the disease as an antiphlogistic and evacuant. After that period, only such laxatives need to be employed as may suffice to keep the bowels soluble.

Tonics and *Stimulants* are to be resorted to only in the gangrenous form of the disease, or towards the termination of the ordinary form, if the patient become weak and prostrated. In the gangrenous form the tonic treatment should be combined with the local treatment already described. Under these circumstances, the diet ought to consist of nutritious milk preparations, and of light broths, while wine and brandy in the form of whey, or milk punch, may be given in connection with quinine, or some of the preparations of bark.

CHAPTER III.

DISEASES OF THE STOMACH AND INTESTINES.

GENERAL REMARKS.

THERE is no class of diseases to which children are subject, so embarrassing to write upon as that including the affections of the gastro-intestinal tube. The past and present views held by the best authorities in medicine upon the nature of these diseases, the want of accurate knowledge in regard to them, their complexity, the curious manner in which the stomach, and the small and large intestines, are implicated, in some cases the stomach forming the chief seat of disorder, in others the small or large intestines, or all being simultaneously affected, make it excessively difficult to form to ourselves satisfactory views as to their nature, and of course correspondingly difficult to describe them to others. Since the publication of the last edition of this work, this task has become more difficult than ever. New views in regard to their nature and classification have been put forth by some of the best observers. MM. Rilliet and Barthez, in particular, in the second edition of their most valuable work, have changed or modified several of their former views, and have adopted an entirely different nomenclature. The excellent work of Dr. Chambers, of London, on "Digestion and its Derangements," treats these vexed subjects in a novel, and at the same time, most interesting and instructive manner. I was, at first view, disposed to adopt the new style of nomenclature employed by MM. Rilliet and Barthez, or that followed by Dr. Chambers. After much reflection, however, I determined to follow the same plan as that made use of in the last edition, preferring to wait until further researches have shown whether the later nomenclature is really preferable or not. I shall endeavor, however, to make use, as far as possible, of the practical applications of the recent researches, and at some future time to modify my nomenclature, should this become necessary.

I shall continue, therefore, to divide the different gastro-intestinal diseases into two classes, one of which will include all that seem to depend on simple functional derangement, independent of any anatomical alteration, cognizable by our senses; and the other those which depend on inflammation or its consequences. This division seems to be correct, from the following considerations: 1. I have often met with cases of derangement of the digestive tube which could not be explained as to their causes, symptoms, course, and mode of recovery, on the supposition of inflammation or other appreciable anatomical alteration. 2. There are on record many cases of greater or less derangement of the functional expression of these organs, in which the most careful examination after death revealed no alteration in the tissues to explain the symptoms. Such are the cases referred to by M. Billard, who says (*Mal. des Enfans*, p. 392): "Many children at the breast have diarrhœa without enteritis; they lose color, become etiolated, fall into a state of marasmus, but at the autopsy, not a trace of inflammation of the intestines is found." M. Berton (*Mal. des Enfants*, 2me ed., p. 574) states that of 57 cases of gastro-intestinal disease observed by himself, there were 4 in which not a trace of inflammation nor any appreciable lesion of the digestive tube could be found. MM. Rilliet and Barthez (1ème édit., t. i, p. 491) remark, that in about every twelve children affected with more or less abundant diarrhœa, in whom we might expect to find colitis, there will be one in whom the gastro-intestinal tube will be found in a state of perfect integrity. They add, that this conclusion is deduced from a comparison of nearly three hundred autopsies. 3. It is the opinion of several competent observers that such a division of the diseases of the digestive tube ought to be made. M. Billard treats of stomachal and intestinal indigestion, which, he says, may exist independently of inflammation. M. Barrier (*Trait. Prat. des Mal. de l'Enfance*) is of opinion that it is indispensable to distinguish certain lesions of secretion, which he describes under the title of diacrises (a word first employed by M. Gendrin), from the inflammations of the gastro-intestinal tube. He asserts (t. ii, p. 19), that gastro-enteritis, gastritis, and enteritis, rarely constitute in children from one to fifteen years of age, complete and essential morbid conditions, conditions, that is to say, governed in their manifestation, course, duration, termination, and treatment, by the same laws which preside over other essentially inflammatory diseases. In proof of this, he states that in 122 cases of disease of the abdomen observed by himself, there were 54 of diarrhœa, 10 only of inflammatory or catarrhal gastro-intestinal disease, 2 of verminous affection, and one of ulceration of the duodenum. Of these 67 cases, he says that five-sixths at least of the attacks of diarrhœa ought to be classed amongst the diacrises or lesions of secretion. After describing the alterations which occur in the follicular diacrisis, he says (*Loc. cit.* p. 33): "These alterations are evidently not of an inflammatory nature, and do not therefore justify us in giving to the disease the title of gastro-enteritis, or colitis, as has been done by most of the later writers, and particularly Billard, who attributed them to follicular gastritis or enteritis." M. Barrier accordingly describes, first, the inflammatory affections of the digestive tube, under the usual title of gastro-intestinal inflammation; and then the diacrises or lesions of secretion of the gastro-intestinal mucous membrane. Of the latter class he makes five divisions: 1, follicular or mucous diacrisis; 2, acescent diacrisis; 3, serous diacrisis; 4, ventose diacrisis; 5, verminous diacrisis. M. Bouchut (*Man. Prat. des Mal. des Nouv.-Nés*) divides the diarrhœas of children into catarrhal or spasmodic, and inflammatory diarrhœa or entero-colitis. The former disease he believes to depend on a functional lesion with hypersecretion of the intestinal mucous membrane, the anatomical cause of which escapes our search. It is independent, he says, of any appreciable alteration of the digestive tube. MM. Rilliet and Barthez, in their second edition, follow an entirely different plan in their description of the diseases of the gastro-intestinal tube, from that which they employed in their first. They divide all the gastro-intestinal diseases into three sections (2ème édit., t. i, p. 720). The first section includes the catarrhal diseases, and this is subdivided into two classes, one of which treats of the catarrhs and catarrhal inflammations, primary and secondary, but simple; in the other are grouped the diseases in which to the catarrh is joined a disturbed condition of the nervous system.

In the second section they describe the doubtful, but non-inflammatory catarrhal diseases.

In the third section they treat of the non-catarrhal diseases, which are again subdivided into two classes. One subdivision of the first section includes the *embarras gastrique* of the French writers, corresponding to the simple indigestion of this work, and to the ordinary "bilious attack" of some English writers, and the simple diarrhœa, whether acute or chronic, of this work. The second subdivision of the first section includes the entero-colitis and cholera infantum of this work.

The second section includes typhoid enteritis and dysentery.

The third section includes, in the first subdivision, grave primary gastritis, gastritis, gastro-enteritis, and enteritis; and in the second subdivision, invagination of the intestines.

In their last edition, therefore, these authors ascribe, as may be seen from their nomenclature, vastly greater importance to the catarrhal conditions of the gastro-intestinal tube, than they did in the former edition. In the first edition, these diseases were all described under the head of inflammations and softenings of the stomach and of the intestines. In the second edition, the terms inflammation and softening are seldom used, except in connection with, and in subordination to, the term catarrh. Nearly all the digestive ailments of early life, and all physicians know how numerous they are, are described under some one of the forms of catarrh. They have, in fact, adopted opinions almost identical with those that had already been published by MM. Barrier, Gendrin, and Legendre. These have already been referred to above. All these writers regard inflammation and its consequences as playing a much less serious part in the diseases of the alimentary canal, than had previously been generally supposed.

I think it must be admitted, from the facts and opinions just stated, that there are two distinct morbid conditions of the digestive tube; one, in which there are no evident anatomical lesions, and another, which, to say the least, is connected with inflammation and its results. To the first of these conditions I shall apply, when it affects the stomach, the term indigestion; and when it affects the intestines, that of simple diarrhœa. To the second class I shall apply the usual terms, gastritis, and inflammatory diarrhœa or entero-colitis. I would remark, however, that it seems most probable that these two states are often merely different degrees of disease, and that simple functional derangement often becomes inflammation, when it continues for any length of time. The follicular or mucous diacrisis of MM. Gendrin and Barrier, probably depends at first upon functional disorder of the secretory apparatus of the digestive tube, which frequently passes into inflammation and its consequences.

Before beginning the history of the diseases of the stomach and bowels, I would call the attention of the reader to the well-established fact, that it is much more common to meet in children with affections of these two portions of the alimentary canal existing simultaneously, than with affections of either alone. Of 150 cases of inflammation of the infra-diaphragmatic portion of the digestive tube, carefully collected by Billard, there were 90 of gastro-enteritis, 50 of enteritis without gastritis, and only 10 of gastritis without enteritis. Of 57 cases of gastro-intestinal affections observed by M. Berton (*Loc. cit.* p. 574), there were only 4 of gastritis alone, whilst there were 27 of gastritis complicated with some intestinal lesion, 4 of enteritis, 11 of entero-colitis, and 4 of colitis. In 3 there was merely slight development of the isolated follicles, and in the remaining 4 not a trace of inflammation nor any other lesion. MM. Rilliet and Barthez state that they have met with 61 cases attended with some lesion of the stomach, in only 15 of which was that organ alone affected, whilst in the remaining 46 there was either duodenitis, enteritis, colitis, follicular enteritis or colitis, or lastly, softening of the mucous membrane. The authors of the Bibliothèque du Médecin Praticien state (t. v, p. 573), "that it is rare to find any serious alteration of one of its (gastro-intestinal canal) portions, without the others participating to a greater or less extent." M. Bouchut (*Loc. cit.*) appears to think that diseases of the stomach never occur in children as a separate lesion, at least he asserts this of softening of that organ (p. 281), and treats of the other alterations of its mucous tissue only under the head of Entero-colitis.

SECTION I.

FUNCTIONAL DISEASES OF THE STOMACH AND INTESTINES.

ARTICLE I.

INDIGESTION.

Definition; Frequency; Forms.—By the term indigestion, I mean that condition of the stomach in which its function of digestion is disturbed or suspended, independent of inflammation or other disease of the organ, appreciable by our senses. It is a very frequent affection during the whole period of childhood, and is one of great importance on this account, and from the fact of its laying the constitution open, by the debility and cachexia which it produces, to various secondary affections. In my description of the disease, I shall distinguish between the forms which occur during infancy, and after the completion of the first dentition.

CAUSES.—The principal causes of indigestion in infants are an unhealthy state of the milk of the nurse, the use of artificial diet, and lastly, an impaired condition of the digestive function, which disables the stomach from digesting even the most healthful aliment.

The milk of the nurse may be too old for the child, for it has been found that a breast several months old, sometimes, though not always, disagrees with a young infant, in consequence no doubt of the milk being thicker and richer at that time than immediately after parturition. The breast-glands may continue to secrete colostrum for weeks or even months after parturition, and when this is the case the child is almost sure to suffer from indigestion and diarrhœa. The milk may be unwholesome because the nurse is in bad health, or because her diet is not properly regulated. That the diet of the nurse affects her milk, I have no doubt, though this has been denied by some persons.

I have known several children to suffer from indigestion, attended with vomiting, acid secretions, colic, and diarrhœa, in consequence of the nurse having indulged in a very rich diet, and particularly in vegetables and fruits. I do not mean to assert that all nursing women should abstain from fruits, or even live on a very simple diet, for I have known some who could make use of the richest food, and eat abundantly of all kinds of vegetables and fruits, without the least injury to the child. But there are others who cannot do so without occasioning indigestion in their infants, because, probably, their children are unusually susceptible to the action of the materials absorbed from that kind of food. Again, it is clearly proved, by recorded cases, and by the opinions of various authorities, that the milk of the nurse is affected by her moral condition. Children have been known to suffer greatly, and even to die from taking the milk of a nurse who had just before undergone a fit of violent anger. The depressing moral emotions, as anxiety, grief, fear, and despair, are well known to affect the milk secretion in such a way as sometimes to occasion indigestion.

The use of artificial diet for young infants, or as the expression is, "bringing up on hand or the bottle," is, I believe, by far the most frequent cause of indigestion during infancy. Very many children with whom this is attempted die of indigestions, chronic diarrhœas, gastritis, entero-colitis, cholera infantum, and thrush. Very few escape frequent attacks of one or other of the diseases just named. Much depends, no doubt, on the selection and preparation of the food. It may be stated as a well-established fact, that a diet consisting wholly or in great part of farinaceous substances, very rarely fails to disagree with the child, and to produce indigestion and other disorders of the digestive system which often prove fatal; while one in which cow's or goat's milk enters as the principal ingredient, though inferior to the natural aliment, and often productive of indigestion, is far less injurious than the one before spoken of.

A third cause of indigestion was stated to be the absence or loss of the digestive power of the stomach, independent of the nature of the food. This is a condition similar to the dyspepsia of the adult. It may be congenital or may result from causes brought into action after birth. It often remains as a consequence of previous indigestions from improper or excessive feeding. It exists during the invasion, course, and convalescence of various diseases. Dentition frequently diminishes or impairs the tone of the digestive function, so that the child is often unable, during that process, to digest aliment which had agreed with it perfectly well at other times.

The causes of indigestion after the completion of the first dentition are congenital feebleness of the digestive function; a certain want of power of that function, which remains often for years in children reared upon artificial diet, and in those who have been debilitated by frequent attacks of disease of any kind; the habitual use of improper diet; the eating of crude, indigestible food; the process of the second dentition; the want of due exercise in the open air; residence in large cities; and undue exercise of the mental faculties in the conduct of the education of the child.

SYMPTOMS.—I shall describe first the symptoms of indigestion as it occurs during infancy, and secondly as it occurs during childhood, or after the completion of the first dentition.

Indigestion during infancy may be advantageously considered under two heads: as occasional or accidental, and as habitual. By the former I mean that which occurs in a healthy infant from a transient cause, such as repletion or a momentarily unhealthy state of the nurse's milk from some imprudence on her part as to diet, from some moral cause, or from sickness; and that which depends upon the passing influence of dentition. By habitual indigestion, I mean the form of the affection which is long continued in consequence of a persistence of the cause.

The symptoms of *occasional* or *accidental* indigestion in infants are: paleness and contraction of the face; restlessness and peevishness; moaning and crying, or in some cases, screaming; nausea, shown by excessive paleness, often by very great languor, and by occasional retching, which may either subside without vomiting, or as more frequently happens, terminate in that act; flatulent distension and hardness of the abdomen, especially in the epigastric region, often accompanied with eructations; and in many of the cases simple diarrhœa. These symptoms usually come on soon after nursing freely, or after a very hearty meal of artificial food, in a child previously in good health. The attack seldom lasts more than a few hours or one or two days. The vomiting which almost always takes place, and which relieves the stomach from the offending cause, very often accomplishes the cure.

Habitual indigestion in infants causes a train of symptoms which are different from, and much more severe than those just described. Of these the most important are: frequent attacks of nausea and vomiting, and of simple diarrhœa repeated for days, weeks, or months in succession; paleness, or some other unhealthy tint of the cutaneous surface; continual restlessness and discomfort, with fretting or crying, particularly in the after part of the day and during the evening and night, in place of the natural ease and quiet of a healthy infant; constant fits of the most violent screaming from colic, sometimes lasting for hours; dull and languid expression of the countenance, or else an uneasy, contracted look, like that produced by continued suffering; more or less emaciation; failure of the natural growth in stature and size, so that the child is small and puny for its age; want of calorific power, causing the child to suffer unusually from cold, as shown by frequent coolness of the hands and feet; irregular appetite, which makes it necessary to tempt by frequent changes of the food, or more or less complete anorexia; and lastly, the various symptoms that indicate an impoverished state of the blood and bad nutrition.

In some cases there are added to the above symptoms, or there follows as a consequence of the indigestion, those of gastritis or entero-colitis, to be hereafter described. Indigestion probably seldom proves fatal in infants, except from the occurrence of some inflammatory complication, as for instance, one of the diseases just named, or acute disease of some other principal organ.

Indigestion in children who have completed the first dentition may, as in the case of infants, be occasional or habitual. *Occasional indigestion* occurs in strong and vigorous, as well as in more delicate subjects. The attack generally begins within a few hours or a day after the child has eaten some indigestible substance, with languor and chilliness in older children, and with languor and peevishness in those who are younger; after which there is headache, pain in the stomach in most of the cases, and very often a disposition to somnolence. If the child is attacked with vomiting soon after the appearance of these symptoms, and ejects the offending material, it will often seem perfectly well from that time. If, however, this do not take place, fever, sometimes of a violent character, is almost certain to make its appearance. The pulse becomes very frequent, rising to 120, 130, 160 or over, and being full and resisting; the skin becomes flushed, dry, and very hot; the appearance of the tongue is not generally changed early in the attack; there is considerable thirst; the child is restless and uneasy, tossing from side to side, or it lies in an uneasy sleep, attended with frequent starting and jerking of the limbs or crying out; the abdomen is natural, or hard and distended over the epigastric region. When the symptoms just described make their appearance suddenly, by which I mean in the course of a few hours, in a child two, three, four, or five years old, after it has eaten some indigestible substance, there is reason to fear an attack of convulsions. The probability of the occurrence of this accident is great in proportion to the earliness of the child's age, and the impressibility of its nervous system. The attack is particularly to be apprehended, and should be carefully guarded against, whenever the fever is violent, especially if the pulse runs very high, when there are urgent complaints of headache, when the restlessness and agitation are very great, or when there is somnolence, with frequent startings or twitchings of the muscles. Convulsions sometimes occur without any previous warning, or after such slight signs of disorder as would fail to produce uneasiness in the parents or attendants.

The symptoms produced by occasional indigestion generally continue until nature relieves the stomach by vomiting or diarrhœa, or until the remedies proper in the case, the most important of which are evacuants, have been administered. It happens not unfrequently, that symptoms of gastric or intestinal disorder remain for some days after the violence of the attack has subsided, and in some instances the disturbance is so great as to occasion gastritis, entero-colitis, or dysentery.

Habitual indigestion in children who have completed the first dentition, is not at all an uncommon affection. It is a condition analogous to, if not identical with, the dyspepsia of the adult. The symptoms of this form are the following. The general appearance of the child is delicate, as shown by a pallid or sallow tint of the skin, instead of the ruddy complexion of health, by thinness and want of proper development of the limbs and trunk, and by softness and flaccidity of the muscular tissues. There is an habitual air of languor and listlessness, with absence of the usual gaiety and disposition to play natural to the age, and the child often complains of being tired. The appetite is feeble or uncertain, being sometimes absent, and at other times too great; or it is peculiar, there being a willingness to eat of dainties, but a refusal of food of a simple character. The tongue presents nothing peculiar. It is however more frequently somewhat furred than clean and natural. The temper is usually irritable and uncertain. The child rarely sleeps well; on the contrary, the nights are restless and much disturbed, the sleep being broken and interrupted by turning and rolling, by moaning or crying out, and by grinding of the teeth. These latter symptoms, together with picking at the nose, which is a frequent accompaniment, are almost always referred by the parents and nurses to worms, and it is often impossible to convince them to the contrary, even though frequent and violent doses of vermifuges have failed to show the existence of entozoa. The state of the bowels is uncertain. In some instances they are very much constipated, requiring frequent doses of laxatives, or careful regulation of the diet, to keep them soluble; in others they are inclined to be loose, and when this happens, the stools are often lienteric. In others, again, constipation and diarrhœa alternate. The abdomen is usually natural, or somewhat enlarged from flatulent distension; complaints of pain are not uncommon. This form of indigestion, like dyspepsia in the adult, is generally a very chronic affection, seldom lasting less than several weeks or months, and sometimes for years.

DIAGNOSIS.—The occasional indigestion of infants is not likely to be mistaken for any other complaint. The suddenness of the attack, the character and quantity of the matters ejected from the stomach, the absence of symptoms indicating the invasion of any other disorder, the short duration of the symptoms, and the rapid recovery, all render the true nature of the case very clear. That which occurs in older children, on the contrary, is not so easy of diagnosis. In many cases the invasion is not unlike that of scarlet fever. The vomiting, the rapidity of the pulse, the great heat of the skin, and in some cases a certain suffusion of the integument dependent on the activity of the circulation, all render the case doubtful for some hours, or for a day, after which time the difficulty ceases, from the development of the symptoms peculiar to the disorder. I believe that not a few cases of simple angina are mistaken for indigestion, owing to the absence of complaints of sore throat, and the neglect of the physician to examine that part. In such cases the vomiting and sudden attack of fever are ascribed, for the want of another mode of explaining them, to gastric derangement. The diagnosis can be made only by examination of the fauces. The diagnosis of indigestion accompanied by convulsions will be considered in the article on the latter affection.

The habitual indigestion of infants is not likely to be confounded with any other disease. The absence of fever, of tenderness of the abdomen on pressure, or other acute symptoms, all indicate the dependence of the disorder on functional distress of the stomach. The same remarks apply to this form of the disease occurring in older children. Nevertheless, the practitioner should never neglect to make a careful examination, both of the physical and rational signs, of all the important organs of the body, as it sometimes happens that latent disease of some one of them is the cause of the gastric difficulty.

PROGNOSIS.—The prognosis of occasional indigestion is nearly always favorable. It is rarely a dangerous disorder, unless accompanied by convulsions, or some other sign of violent disturbance of the nervous system. Under the latter circumstances, the prognosis should be very cautious, as the termination is not unfrequently fatal in consequence of injury done to the nervous centres. It should be recollected also that this form of indigestion sometimes becomes the exciting cause of inflammation of the stomach or intestines, in which event the prognosis will be that of those diseases.

Habitual indigestion in infants is a serious complaint, and ought always to awaken the solicitude both of the physician and parents; for though a simple functional disease of the stomach is not probably often fatal, it is exceedingly apt to prove so by the induction of gastritis, chronic enteritis, entero-colitis, or thrush, or by its laying the system open to other diseases, and rendering it less able to withstand them, should they happen to occur. In older children it is not, according to my experience, so dangerous a malady. I have never as yet seen it terminate fatally.

TREATMENT.—The treatment of *occasional indigestion* in infants ought to be very simple. The child has generally relieved itself by vomiting before the physician is called. If, however, it continues pale and languid, with vomiting or retching, after the stomach seems to have been emptied, the proper plan is to make use of remedies to calm the irritability of the organ. This can almost always be accomplished by giving a teaspoonful every ten or fifteen minutes, of a mixture of lime-water and milk, consisting of one-third milk to two-thirds lime-water, or of equal proportions of each, or the same doses of a mixture consisting of equal parts of lime-water and cinnamon-water. At the same time a small mustard plaster, weakened with wheat flour, or flannels wrung out of hot brandy and water, may be applied to the epigastrium, or a warm indian mush poultice in a flannel bag, laid over the whole abdomen. Should these means fail to relieve the sickness, from half a drop to a drop of laudanum, or ten drops of paregoric may be administered, and repeated if necessary in two hours. The child generally recovers its usual health after the sickness has entirely ceased. If, however, it remain fretful and uneasy, if it cry much as though in pain, it is probable that a portion of aliment has passed, in a partially or wholly undigested state, into the intestine. The suspicion will be confirmed if the abdomen is found upon palpation and percussion to be swelled, hard, and resonant, from flatulent collections in the bowels. Under these circumstances, a laxative ought to be given. The best dose is half a teaspoonful or a teaspoonful of castor oil, a teaspoonful of simple or spiced syrup of rhubarb, or, if there have been evidences of an acid state of the stomach, about a quarter of a teaspoonful of the best magnesia.

The *occasional indigestion* of older children demands a different and more energetic treatment. After ascertaining that the child has eaten something indigestible, we should inquire whether there has been vomiting. If there has been none, or if only slight, it will be proper to give an emetic immediately. The best one under the circumstances is ipecacuanha. This rarely fails to produce a full effect, and does not perturbate the system, or irritate the stomach like tartar emetic. It may be given either in powder or syrup. The dose is familiar to every one. If the ipecacuanha be not at hand, we may use hive syrup, which is kept in almost every house, or a teaspoonful of powdered alum in honey or molasses, to be repeated, if necessary, in fifteen minutes. Alum is less apt to fail than either ipecacuanha or hive syrup. If the child continue unwell after the operation of the emetic, which is often the case, and particularly if the fever be considerable, a purgative should be given as soon as the stomach will bear it. The best dose is castor oil, which is the most speedy and least irritating. It may be given in orange juice, which forms an excellent vehicle, or, if the child is old enough, in the froth of beer or porter. A dessert-spoonful is generally enough. If the oil cannot be taken, we may give infusion of senna and manna, the fluid extract of senna mixed with spiced syrup of rhubarb, syrup of rhubarb alone, magnesia, to be followed by lemonade, salts and magnesia, or the former alone, or lastly a seidlitz powder. If the fever continue, and the cathartic fail to operate in four or six hours, a purgative enema ought to be given to hasten its effect. A bath at about 96° or 97° will almost always be found useful in these cases. The child should be kept in the bath from eight to twelve or fifteen minutes. The only circumstances which form an objection to this remedy are the facts of the patient being so irritable, or so fearful of the water, as to make it necessary to contend with him in order to succeed in using it. When this is the case it had better not be employed, and sponging with tepid water and spirit should be substituted. If the child complains of pain in the stomach, the application of a warm mush poultice over the epigastrium or whole abdomen will be found of much service.

When, in this form of indigestion, the febrile reaction is violent, as it often is, and particularly when there are signs of great disturbance of the nervous system, consisting of excessive agitation, complaints of severe headache, drowsiness, moaning or crying out in the sleep, or twitching and jerking of the muscles, the physician should beware of a convulsive attack. In such cases as these the patient ought to take a purgative dose of calomel (from three to four grains), have a warm bath at once, soon after an injection, and if not considerably relieved in a very few hours, be bled at the arm to three or six ounces. The remedies ought to be prompt and energetic, for the case is pressing. A convulsion is always a dangerous event in childhood, and should be prevented, if possible. About two hours after the calomel has been given, a cathartic dose had better be administered, in order to insure an action upon the bowels, and to carry the calomel out of the system. These means rarely fail to afford relief in a few hours. The diet should be absolute during the violent stage of the attack, and the usual diet is to be resumed only by degrees. The drinks may be plain water or gum-water taken cold.

It not unfrequently happens that occasional indigestion is followed by gastritis or enteritis, or by habitual indigestion lasting for weeks or even months. These different sequelæ must be treated according to the plan proper for each.

The *habitual indigestion* of both infants and older children requires a very different treatment from the occasional or accidental form. In both the indications are nearly the same. The most important are very careful regulation of the diet in all its details, the use of tonics and stimulants to restore tone and vigor to the digestive function, the employment of remedies to correct the state of the bowels, whether they be relaxed or constipated, and attention to securing the child proper exercise, exposure to the air, and suitable clothing.

If the symptoms of the disorder occur in a child at the breast, the milk of the nurse should be carefully examined, in order to ascertain whether it be good. If found to possess any unhealthy qualities, the nurse ought to be changed at once. Attention to this point alone will almost certainly cure the child. It needs no other remedy.

If the patient is fed wholly or in part, it is essential to regulate the diet to suit the state of the digestive function. Milk ought in all cases to form the basis of the food, unless it has been found by patient trial to be absolutely repugnant to the stomach. I have often found that infants who had been thought quite incapable of digesting cow's milk, could do so very readily when it was very much weakened with water. The usual proportions for an infant of a few months old, are half and half, or two parts milk for one of water. When these are found to disagree, it is well to try three, or even four or five parts of water to one of milk, and if the stomach digest this, as it often will, the proportion of milk may be slowly and cautiously increased to the usual standard. If we conclude that milk cannot be digested by the child, it is best to try cream. Of this, one part to three or four of water, may be given. When neither of these can be taken, some of the farinaceous substances may be tried; arrow-root, sago, barley, tapioca, oatmeal, or rice. I am clearly of opinion, however, that these articles prepared with water alone, never agree with children when they are continued for any considerable length of time. Some infants of six or eight months old, it may be remarked, who cannot digest more than very small quantities of milk, will take and digest well, very delicate broths made of chicken or mutton, or small quantities of the lightest meats, as mutton, chicken, or very tender beef, minced up extremely fine, and given by teaspoonfuls.

In cases of this kind I have found a diet consisting of gelatine, milk, cream, and arrow-root, prepared in the manner directed in the article on thrush (see p. 267), to suit better than anything else. I have met with several children, and with two in particular, whom it was necessary to feed to the amount of a pint or a pint and a half a day, in addition to their being nursed occasionally, who could take neither milk and water, cream and water, milk and arrow-root, oatmeal gruel, rice gruel, nor indeed anything that was tried, without vomiting, colic, and severe diarrhœa, who digested perfectly well and throve admirably upon the preparation alluded to. I have now used it during several years, and have recommended it for a great many children, and do not hesitate to say that it agrees with a larger number than any diet I have employed or seen employed.

The diet of older children laboring under chronic weakness of the digestive function is as important as that of infants. Two chief ends should always be borne in mind in selecting it, digestibility and nutritiousness. The former is all-important, for without it, the stomach, constantly irritated by improper food, has no chance of regaining its tone, while the latter is necessary in order to sustain the strength of the child, and allow it to carry on its growth. I have generally found it most prudent, and often really necessary, to specify as to the substances to be given at each meal. The morning and evening meal ought to consist of bread and milk, mush and milk, or of milk, warm water and sugar (called in this country children's or cambric tea), and bread and butter, and nothing else in most of the cases. It is sometimes proper to allow a soft-boiled egg, particularly if the child be very fond of it. The dinner ought to consist of light broths containing rice, with bread or toast, or of the plain meats, as mutton, beef, chicken, turkey, birds, or fine game. No vegetable ought to be allowed in most of the cases except rice, as all others, even the potato, are very apt to disagree. I believe that the potato is more digestible when roasted than when boiled. If the child require anything between breakfast and dinner, it may have what is allowed at breakfast, or dry bread and nothing else. There are various articles of diet which should be absolutely forbidden, amongst which are hot and sweet cakes, and hot bread of all kinds; sausages, not unfrequently given to children in this country; corn-beef, ham, veal, pork, goose, ducks, fish; all manner of dessert, excepting rice-pudding, or curds-and-whey, often called junket; sweetmeats, candies, fruits, except some of our finest summer ones; and to conclude, everything which long observation and experience have shown to be unsuitable to a dyspeptic stomach.

It is sometimes very difficult to find anything to agree well with the child. In one case of a child three years old that came under my observation, neither milk, bread, nor meat, could be taken. The caseum of milk seemed to be absolutely indigestible, as it would be rejected from the stomach many hours, or even a day or two after the milk had been taken, in the form of masses of dry, fibrous cheese, of an oblong shape, nearly or quite as large as a peach-stone. After trying various articles I found that the child digested raw oysters, soda-biscuit, and rennet-whey, and upon these articles alone she lived for two weeks, at the end of which time she had improved so much as to be able to take the white meat of chicken very finely minced. She gradually regained her previous health.

After regulating the diet, such remedies as tend to invigorate the digestive functions ought to be prescribed. The most important of these are the vegetable and mineral tonics, and mild stimulants. I have found quinine, iron, and small quantities of port wine or brandy, to succeed better than anything else. To a child under two years old, from a quarter to half a grain of quinine, and to one over that age, a grain, may be given three times a day, and continued for two, three, or four weeks. It is best given to young children diffused, without being dissolved, in a mixture of equal parts of syrup of gum and ginger; while to those who are older it may be administered in pill. The best preparations of iron are the iodide, or the pure metallic iron prepared with hydrogen. Of the former, half a drop to one drop for infants, and from two to four drops for older children, may be given three times a day; of the latter a quarter of a grain for infants, and half a grain to a grain for those who are above that age, may be given three times a day. The metallic iron is best administered in pill or suspended in syrup of gum arabic. When there is any suspicion of a scrofulous taint in the child's constitution, or when it is disposed to have chronic irritations, excoriations, or ulcerations of the nostrils, otorrhœa, or papulæ or pustules about the eyelids or other parts of the body, it is useful to give the iron in compound syrup of sarsaparilla, of which half a teaspoonful three times a day is quite enough. Under these circumstances, and particularly when the dyspeptic condition is accompanied with frequent nausea or occasional vomiting, with frontal headache, and with constipation, seeming to indicate a disposition to tubercular deposit in the system, I have found cod-liver oil the most efficient of all the remedies that I have tried. It has often removed with great rapidity the dyspeptic symptoms, invigorated the general health, and, in fact, restored the patient to health. The dose is from half a teaspoonful to a teaspoonful twice or three times a day, at the age of six or eight years. It is best taken in a small quantity of malt liquor, or floating on strong mint-water or syrup of ginger. In very young children, and in older ones also, when the latter refuse to take it in the ordinary methods, the following formula for its administration will be found one of the best:

℞.—Ol. Jec. Aselli,	℥ss.
P. G. Acaciæ,	℥ss.
Ol. Cinnamomi,	gtt. vi.
Sacch. Alb.,	ʒi.
Aq. Cinnamomi,	ʒiii.—M.

Ft. Mistura.

Dose—A dessert-spoonful three times a day,—after eating.

In connection with these remedies, a little port wine or brandy, and the former is preferable in children over a few years old, on account of the possibility of their contracting a taste for the brandy, may be allowed twice or three times a day, or at dinner only. To young children one or two teaspoonfuls of brandy may be given in the course of the day, mixed in water; of the port wine from a teaspoonful to a tablespoonful, according to the age and strength of the patient, may be repeated morning, noon, and night.

If the bowels are inclined to constipation, they should be kept soluble by laxative enemata, and by the use of rhubarb or aloes; when relaxed, the frequency of the discharges may be controlled by the cretaceous mixture, by anodyne enemata given once or twice a day, by the aromatic syrup of galls (to be described under the head of entero-colitis), or by some of the astringents in common use.

In all cases of chronic indigestion in children, it ought to be regarded as an essential part of the treatment to secure to the patient a proper amount of exercise in the open air. In summer the child should pass several hours of every day in the air. It ought, indeed, if the heat of the sun can be avoided by proper shade, to pass the whole day in this way. In winter it is, of course, impossible to carry this system to the same extent, but the child should nevertheless be taken out at least once a day; this may be done in the coldest, and even in damp weather, if sufficient clothing be worn. If a child comes back from a walk with warm limbs, and with its cheeks in a glow, there is little danger of cold. The quantity of clothing must depend on the constitution and idiosyncrasy of the patient. Some need twice as much as others. The proper amount is best determined by the temperature and coloration of the surface after a walk.

ARTICLE II.

SIMPLE DIARRHŒA.

General Remarks.—I have already said that I should treat of two different morbid conditions of the intestinal tube, one in which there is no evident anatomical lesions to explain the symptoms, and which appears to depend on simple functional derangement, to be designated by the title of simple diarrhœa; and another in which there is evident inflammation with its results, to be described under the titles of Entero-colitis and Cholera Infantum. The reasons for adopting this division have already been given in the general remarks upon the diseases of the stomach and intestines, and it is unnecessary to repeat them at this place.

Dewees, Eberle, and other writers, treat of the diseases of the intestines under two heads only, those of diarrhœa and cholera infantum. Stewart and Condie treat of the same diseases, but describe inflammation of the intestines also, by the titles of enteritis and colitis. Most of these writers make different forms of diarrhœa, the feculent, bilious, mucous, chylous, and lienteric, and it would seem most natural that I should follow the same plan. I am disposed to believe, however, that these varieties ought not to be regarded as constituting separate and essential morbid conditions of the intestinal tube, but that they are, on the contrary, merely degrees or stages of simple diarrhœa or functional derangement, and of entero-colitis or inflammation of the intestines. We may in fact have feculent, bilious, mucous, or lienteric discharges at different stages of both these diseased conditions. It seems to me most proper therefore not to consider them as distinct affections, though I shall continue to employ the terms, in order to express the characters of the diarrhœa in different diseases of the intestinal tube. I would remark, in further elucidation of this point, that the feculent diarrhœa of the above authors, comes as a general rule within the class of simple diarrhœa, whilst in other instances it is merely one of the symptoms of the first stage of entero-colitis; and that the bilious, mucous, and lienteric diarrhœa may exist both in the functional and inflammatory diseases of the bowels.

DEFINITION; FREQUENCY.—By simple diarrhœa, I mean the form of diarrhœa which exists without perceptible signs of inflammatory action in the intestine; which is known by post mortem examinations to occur without appreciable anatomical lesions; and which we must conclude, therefore, to depend on simple functional derangement.

It is undoubtedly a very frequent ailment in children, more especially from birth to the termination of the first dentition. It is of common, though of less frequent occurrence, from the last-mentioned period to the age of eight or ten years, after which, according to my experience, it becomes rare.

CAUSES.—The causes of the disease during infancy are *unfavorable hygienic conditions*, as the habitation of unwholesome, ill-ventilated, damp, and filthy dwellings, or of contracted and crowded quarters of cities and towns; an *unhealthy state of the milk* of the nurse; the use of *artificial diet* at too early an age, especially that of an improper kind; *cold; dentition;* and lastly, great *atmospheric heats.* The most important of these are improper alimentation, by which I mean the use of artificial diet, and particularly one consisting chiefly of farinaceous substances to the exclusion of a proper amount of milk, and dentition. For a fuller account of the influence of these different circumstances on the digestive organs of children, the reader is referred to the remarks on the causes of entero-colitis, and to the article on thrush.

The chief causes of the disease after the first dentition are, according to my experience: the habitual use of *improper food;* the *loss* of digestive power, which often follows a severe indigestion, or an attack of some acute disease; the *debility of constitution* which attends sudden and rapid growth; the *want* of proper exercise and exposure to the air; the predisposition which exists in some children from *hereditary* causes; and the disturbing influence of the *second dentition.*

The system of indiscriminate diet allowed to children in this country is, it seems to me, a fruitful cause of gastric and intestinal complaints. I believe that, as a general rule, children over two and three years of age, are allowed amongst us to eat of the food prepared for the older members of the family. Now, any one who will reflect upon the variety of dishes habitually placed upon an American table, ought not to be surprised to see children permitted a choice amidst such profusion, pale, thin, delicate, exposed to frequent indigestions, attacks of diarrhœa, and entero-colitis, to gastric fevers, and the host of minor ills attendant upon feeble digestive powers. I am acquainted with some families in this city, the children of which, from the age of two years, are allowed habitually to breakfast upon hot rolls and butter, hot buckwheat cakes, hot Indian cakes, rice-cakes, sausages, salt fish, ham, or dried beef, and coffee or tea; and to dine upon a choice of various meats and a great variety of vegetables, which latter they often prefer to the exclusion of meat, and then to make a rich dessert of pies, puddings, preserves, or fruits; and lastly to make an evening meal of tea and bread and butter, almost always relished, as the term is, with preserves, stewed fruits, hot cakes of some kind, or with radishes, cucumbers, or some similar dish. Add to such meals as the above the eating between whiles of all kinds of candies and comfits, which many children here regularly expect in larger or smaller quantity, cakes both rich and plain, fruits to excess and at all hours, from soon after breakfast to just before going to bed, raisins and almonds, and nuts of various kinds, and the wonder is, not that we are a pale, thin, dyspeptic, and anxious-looking race of people, compared with Europeans, but that we have any health at all, when our children are allowed to make use of the indiscriminate and unwholesome diet just described. Such a system undoubtedly occasions frequent attacks of the disease under consideration, and unless the diet be changed early in the attack, it is very apt to become chronic. It has been stated that simple diarrhœa sometimes followed as a consequence of indigestion. I have known such a result to occur in children previously in fine health, and to continue for several weeks or months. In these instances, the disorder appears to depend in good measure on the loss of the digestive power of the stomach. This seems proved by the great influence which the character of the food has upon the malady, which is always aggravated by the use of any articles except those universally acknowledged to be the most digestible, and also by the frequent coexistence of lientery when the food is not of the lightest kind.

I have several times met with cases which I could ascribe to no other cause than debility and want of power of the digestive organs, dependent upon too rapid growth. That sudden and rapid growth may produce feeble digestion, or in other words, a dyspeptic state, is, in my opinion, proved by the following consideration. It is attended with loss of appetite, emaciation, paleness, languor, and weakness, and frequent attacks of diarrhœa, or a chronic form of that disorder; all of which symptoms are greatly influenced by the regimen of the child, and are most readily removed by attention to that point, and by the use of tonics and stimulants.

The other causes enumerated need but little comment. I will merely remark that I have several times observed a predisposition to weakness of the digestive organs, transmitted apparently from parent to child. As to the influence of the second dentition, I have no doubt that it is a frequent cause of the complaint, and I believe that it is too little attended to by practitioners.

SYMPTOMS.—I shall describe first the symptoms of simple diarrhœa in infants, and afterwards those which characterize the disorder in older children. In infants the appearance of the diarrhœa is usually preceded or accompanied by slight disturbance of the *temper* and *comfort* of the child. There is some degree of *restlessness*, *peevishness*, and disposition to cry; the child sleeps less than usual, and often starts and moans during sleep; all of which symptoms are more marked, as is the case indeed in nearly all the ailments of children, during the night. Though the symptoms described are observed from time to time, and particularly during the night, they are not always present, as the infant will occasionally through the day seem perfectly well and comfortable, with the exception perhaps of slight paleness and languor, almost always perceptible upon its countenance. There is no *fever* in these cases, or at least nothing more than unusual warmth of the hands, feet, and abdomen, at night. If a marked febrile reaction take place, there would be reason to suspect the existence of some degree of entero-colitis. The *mouth* often becomes, after a few days, a little warmer and less moist than usual; the *tongue* is generally moist and only slightly coated; and the *appetite* is commonly diminished, as shown by the child's nursing with less eagerness and at longer intervals than before. In very mild cases the *stools* are at first, and sometimes throughout the attack, feculent: the only differences from their ordinary characters are that they are more frequent, thinner, more copious than usual, and that the odor is changed so as to become acrid and offensive. In severe cases, they contain less feculent matter, become yet more fluid and sometimes watery, and exhibit small particles of a greenish color, scattered through them; or the whole of the discharge is of a deep green color, and it is intermixed with portions of mucus. In many of the cases, whitish lumps, evidently consisting of undigested curd, are observed mixed with the other substances upon the napkin. The number of stools varies from two, three, or four, to six or eight, in the twenty-four hours. The number last mentioned is seldom exceeded, so long as the diarrhœa remains simple. The *abdomen* is seldom distended, or painful to the touch. The *general appearance* of the child almost always shows the effects of the malady upon the constitution, after a few days. The countenance becomes paler and thinner; the eyes look somewhat hollow; the edges of the orbits are more defined, and often present a pale bluish circle; slight emaciation takes place, and the flesh of the child becomes softer and more relaxed than before the attack. The *duration* of the disorder is generally short, as it seldom lasts more than three or four days, or a week. It may terminate in complete restoration to health, without having exposed the life of the child to danger, or, if the causes which gave rise to it continue in action, if the child is of delicate constitution or the treatment not correct, and especially if this is of too perturbating a character, it is very apt to run into entero-colitis and expose the patient to all the dangers of that disease.

In older children (after the first dentition), the disease is much less frequent than in infants, and presents a different train of symptoms. Often it is nothing more than a slight disorder of the bowels, amounting to three, four, or five stools, thinner and more abundant than usual, accompanied by slight colicky pains, and unattended by fever or other signs of sickness, which, after continuing one, two, or three days, ceases, and the child regains its usual health. Some children are particularly liable to these attacks, and suffer from them every few weeks, or after any indiscretion in diet; whilst in others they are rare, let the diet be what it may.

There is another form of simple diarrhœa, however, of which I have seen nine cases, much more troublesome than the one just described. It occurs in children from two and a half to seven and eight years of age, lasts a considerably longer time, and is much less under the control of remedial measures. This form of the disease has never in the cases that I have seen, been accompanied by fever, or by any constitutional symptoms rendering it necessary to confine the child either to the bed or house. The only symptoms besides the diarrhœa which I have observed, have been some degree of paleness, and moderate emaciation; slight weakness, shown by an indisposition on the part of the child to play with its usual spirit, by an inclination to lie about from time to time through the day on the sofa or floor, and by complaints of "being tired;" irritability of temper and peevishness; irregular appetite; picking of the nose; and restless, disturbed sleep at night, attended with moaning, crying, starting, and grinding of the teeth; all of which symptoms generally convince the mother that the child is suffering from worms. The abdomen is sometimes slightly tumid, but remains natural as to tension, and is not painful on pressure. There is no pain except slight colics in some cases. The stools have generally numbered from three to five, and in a few cases as many as six or eight a day. They are semifluid in consistence, often of a very offensive odor, and consist usually of feculent matter, which is sometimes clay-colored, more frequently dark brown, and, in other instances, deep yellow or orange in color. They are often also of a frothy character. In two of the nine cases that I have seen, there was lientery whenever the aliment was otherwise than of the lightest and most digestible kind. In all, the diarrhœa was evidently greatly influenced by the diet, showing, it appeared to me, a manifest dependence of the malady upon the condition of the stomach, which seemed to have lost to a great degree its digestive power.

The *course* of the disease in this form was variable. In some it would last a few weeks, and then, under the influence of diet and remedies, cease, to recur and run the same course after a short period. In others it has lasted a much longer time in spite of all treatment that I attempted. In three of the cases it continued between three and four months, with occasional slight remissions, brought about apparently by remedies which a day or two after would lose their effect. In two others it lasted about two months; in another six weeks, in another a month; in the remaining two cases the exact duration is not recollected.

Diagnosis.—The diagnosis of simple diarrhœa will rarely present any difficulties, since there is nothing with which it could be confounded, except the diarrhœa from tubercular ulceration of the bowels, or entero-colitis. From the former it is to be distinguished by the history of the case, and by the signs of tuberculization in other parts of the economy; from the latter by the absence of signs of inflammatory action.

Prognosis.—The prognosis is favorable so long as the disease remains simple. The physician should never forget, however, the disposition which is inherent in it to pass into entero-colitis, nor fail to make the possible occurrence of this transition one element in his prognosis. During infancy it is always more serious than after that period, from the feebler power of resistance on the part of the constitution at that age to disease, which undoubtedly allows this simple affection to prove fatal in some instances, probably from the shock to the nervous system. After infancy it is rarely a dangerous disorder, both because of the greater stamina existing at that age, and from the fact that the disposition to extension of disease is less strong.

Treatment.—The *prophylactic management* of simple diarrhœa is the same as that which is proper for entero-colitis, and as that affection will be treated of at considerable length in a future article, I must on account of my limited space, refer the reader there for information on this point.

After the disease is established the treatment must consist first in attention to the *diet*, *exercise*, and state of the *gums* of the child. In many cases, careful regulation of the diet and exercise, and lancing the gums when they are much distended and vascular from the pressure of the advancing teeth, will suffice to arrest the disorder in a few days, without the necessity of resorting to drugs, which ought certainly to be avoided whenever it is possible to do so. If the child is at the breast, we must ascertain whether the milk of the nurse is good, by inquiry as to its appearance, by examination with the microscope, and by reference to her health, diet, temper, &c., all of which circumstances more or less affect the mammary secretion. If we conclude that the milk is good, or that it has been disturbed in its healthy properties only by a transient cause, the child must be continued at the breast, with the precaution, however, of not allowing it to nurse quite so much as usual. An infant suffering from any kind of diarrhœa, had better be restricted entirely to the breast, unless it be clear that the supply of milk is quite insufficient. If we determine that the milk is unhealthy, the nurse must either be changed, or the child weaned; of course the former alternative is infinitely preferable if the child is under a year old, or even under eighteen months, if it seem to have a rather delicate constitution.

If the case occur in a child already weaned, or in one fed partly on artificial diet, the regulation of the kind, preparation, and quantity of aliment is of the utmost consequence. It ought to consist chiefly of milk or cream weakened with water, unless it has been clearly shown by previous trial that these articles do not agree with the child. I prefer before any kind of diet that I have ever employed, or known to be employed, that made from cow's milk, cream, arrow-root, and gelatine, in the manner described at page 267. The proportions of the milk, cream, and arrow-root must vary with the age and digestive power of the patient. I will merely state, as a general principle, that during the existence of diarrhœa, or at least in the early stage of it, and before the strength has been reduced by the disorder, the proportions of cream and milk ought to be considerably less than in health. Not only this, but the total quantity of food in the day should be diminished, unless the ordinary amount seems to be really necessary for the sustentation of the strength. If it be found, however, after patient trial, that the child either will not take, or does not digest this kind of food, we may try arrow-root or rice-water, thin gruel or panada, alternated with very carefully prepared chicken or mutton water. If the child is six or eight months old, it often suits well to allow it a piece of juicy beef or a chicken bone to suck, or from one to several teaspoonfuls of meat of chicken or mutton minced very fine.

For older children with a common attack of simple diarrhœa, the diet should consist for a few days of boiled milk with bread, of gruels made of boiled milk and arrow-root, rice-flour, sago, tapioca, or common wheat flour, and of small quantities of light broths. Meats are, for the time, improper, and all vegetables, with the exception of rice, yet worse.

In the case of infants it is best to recommend a continuation of the ordinary exercise, unless the weather be cold and damp. Indeed, in good weather, exposure to the air and proper insolation are more important during the existence of this disorder than even during health. The same remarks apply to older children, with the exception that they ought not to be allowed to fatigue themselves, particularly in warm weather, as this would tend to aggravate the complaint.

When the disorder occurs in a teething child, the gums ought always to be examined by the physician, and if found swelled, vascular, of a deep red color, and hot, with the outline of the advancing tooth perceptible, they should be freely incised to the tooth. If, on the contrary, the tooth is too deep to be felt, I would advise only a slight and superficial scarification in order to relieve the tension of the gum.

The *therapeutical management* of the disease should be as simple as possible. The fewer drugs we can succeed with in the gastro-intestinal complaints of infants and children, the better. When, however, the diarrhœa continues for some days in spite of attention to the points already mentioned, we must resort to some of the means which have been found most useful in checking the inordinate action of the bowels. The most important are a careful employment of laxatives, and the use of opiates and astringents. I have generally commenced the treatment by the exhibition of a teaspoonful of castor oil, containing from half a drop to a drop of laudanum, for young infants, and two drops for older children. This dose alone given for two evenings in succession has oftentimes sufficed to effect the cure. Dr. West recommends very highly in cases of simple diarrhœa, in which the evacuations, though watery, are fæcal, and containing little mucus and no blood, small doses of the sulphate of magnesia and tincture of rhubarb. His formula at one year of age is as follows:

℞.—Magnes. Sulphat.,	ʒi.
Tinct. Rhei,	ʒij.
Syr. Zingiber.,	ʒi.
Aquæ Carui,	ʒix.—M.

Dose—A teaspoonful.

If the diarrhœa persists after this, we must resort to some of the astringents. The one most commonly employed is the chalk mixture, which is officinal in our pharmacopœia. A teaspoonful of this is to be given after each loose evacuation, or three or four times a day. If the case prove obstinate, it will be found useful to add to each dose of the chalk preparation, a small quantity of laudanum or paregoric, or some astringent tincture, the best of which is the tincture of krameria. When the chalk mixture fails entirely, powdered crab's eyes will sometimes succeed; or we may resort to the aromatic syrup of nut-galls. The formulas and doses for both these remedies will be found in the article on entero-colitis. If the discharges are small and frequent, mixed with mucus and somewhat painful, it will be found that small opiate injections (from one to two drops of laudanum in a tablespoonful of prepared starch for young infants, and from three to six drops in double that quantity for older children), or the use of Dover's powder in combination with chalk or sugar of lead, will often succeed in arresting the disease. For further and more complete information in regard to astringents, I must refer the reader to the article on entero-colitis, where they will be fully discussed.

The chronic form of simple diarrhœa which I have attempted to describe, occurring in children who have completed the first dentition, has always proved difficult to manage. From the experience I have had, I believe that the best mode of treating it is by proper regulation of the diet, and by the use of tonics and stimulants, and occasionally of opiates. I was led to adopt this plan in consequence of having failed entirely to control the symptoms by the treatment generally successful in simple diarrhœa, and by the opinion which I came at last to form, that the disease depended in great part on a loss of the digestive power of the stomach and duodenum. The diet must be adapted to the idiosyncrasies of the individual; what we should seek is such an one as will be easily digested by the patient, the materials of which shall not appear in the stools, and one which does not manifestly increase, if it fail to moderate, the frequency of the discharges. The one which I have found to succeed best, consists of boiled milk with stale bread for breakfast and tea, and the tenderest meats, as very fine beef, mutton, chicken, or birds, with rice, as the only vegetable, for dinner. If the child likes flour or rice pap, it may have either in place of the bread and milk. If it will take none of these, it may have milk, warm water and sugar, with bread; or well-boiled mush with milk, or milk toast. Should it refuse the dinner recommended above, we may substitute delicate soup, or some of the milk preparations. Between meals it ought to be allowed nothing but dry bread. All rich food, dessert, fruits, all vegetables except rice, candies and comfits, all kinds of cakes and hot bread, in fact, everything except the articles which I have mentioned or similar ones, ought to be rigidly, systematically, and perseveringly forbidden. Until this has been done for many days, or for several weeks, the disease has always, according to my experience, obstinately persisted.

I have already said that I have not found the ordinary remedies for simple diarrhœa to exert much effect upon the disease. On the contrary, the treatment for dyspepsia, that is to say, a simple but nutritious diet, exercise, and the use of tonics and stimulants, have always removed it in a longer or shorter time. The tonics which I have employed are port wine, quinine, and iron. From a dessert to a tablespoonful of port wine was usually given in water three times a day, in connection with iron. The preparations of iron used were Vallet's mass, of which from half a grain to a grain was given in pill three times a day; the solution of iodide of iron in the dose of first one, and then from two to four drops, three times a day, or the solution of the nitrate of iron in the dose of from two to five drops, three times a day, in water, continued for one or two months. I have sometimes combined with each dose of the solution of iron, a drop of laudanum, especially if there were pain; or the opiate might be given by injection every evening. The quinine was generally administered alone in the dose of a grain three times a day, for one, two, or three weeks. It has not, however, proved so useful as port wine and iron.

In the case attended with all the symptoms usually thought to indicate worms, the use of wormseed oil was followed by the expulsion of several very large lumbricoides. The child did not recover, however, for some weeks afterwards, and not until he had taken port wine and quinine for a considerable period. In other cases in which the verminous symptoms were also strongly marked, and in which the same remedy was given, no worms were expelled.

SECTION II.

DISEASES OF THE STOMACH AND INTESTINES, ATTENDED WITH APPRECIABLE ANATOMICAL LESIONS.

ARTICLE I.

GASTRITIS.

General Remarks.—There are but two diseased states of the stomach attended with organic lesions, which demand our attention. These are inflammation and softening. The medical authorities of the day are divided on the question, whether these conditions ought to be regarded as distinct and separate diseases, or whether softening is not merely a secondary lesion, —the consequence of inflammation, or a cadaveric alteration. I shall consider both under the single head of gastritis or inflammation of the stomach, believing myself justified in so doing by the opinions of MM. Valleix, Rilliet and Barthez, Bouchut, Dr. Carswell, and other writers. The former author (*Guide du Méd. Prat.* t. v, p. 118) says, "It seems to me, therefore, impossible, in the present state of the science, to distinguish during life, the cases of simple pale softening with thinning, from those in which softening is associated with evident traces of inflammation." At page 145 of the same volume, he says: "A description of the symptoms of pale softening with thinning of the gastric mucous membrane might therefore be drawn; but as it would differ in no respect from that which I have already presented of chronic gastritis, it would be useless to reproduce it here, or, to speak in clearer terms, I believe it results from the preceding discussion, that we ought to confound, in regard to the symptoms, this form of softening with chronic gastritis, of which it is generally a consequence, either pathological, or cadaveric." MM. Rilliet and Barthez, in their second edition (t. i, p. 672), speak as follows: "To conclude, we believe that softening of the stomach is sometimes a morbid lesion, and sometimes a cadaveric phenomenon. The labors of those who have preceded us, lead us to suppose that the second alteration is much more frequent than the first. We are unable to say what anatomical differences distinguish the two kinds. It appears to us, however, that the gelatiniform softening is most generally pathological, whilst the other is more usually cadaveric." M. Bouchut (*Loc. cit.* p. 231) says: "Never, indeed, in young children, does softening of the stomach constitute an isolated disease; what has been asserted of that alteration belongs in fact to entero-colitis, which we have just described."

The authors of the *Bib. du Méd. Prat.* (t. v, p. 600) are of opinion that it is doubtful whether softening ought to be regarded as a distinct and idiopathic disease or not, but that it is a pathological and not a cadaveric lesion, they think cannot be contested. Dr. Carswell (*Cyclop. Prat. Med.* vol. iv, p. 13 and 15) says it may occur either as a pathological or post mortem lesion, and that in the former case it is a consequence of inflammation. He states that when softening of the gastro-intestinal mucous membrane is dependent on inflammation, "the symptoms are those of gastritis or gastro-enteritis," and adds: "It need hardly be observed that there are no symptoms referable to the state of softening which we have described, considered in itself, and as a termination of inflammation of the mucous membrane." M. Barrier (*Mal. de l'Enfance*, t. ii, p. 118) says, he cannot agree with those who regard softening of the gastro-intestinal mucous membrane as a specific disease. He considers it to be a simple lesion of tissue "generally produced after death, and which, when it commences during life, never appears except as the consequence of an anterior morbid condition." He supposes both gelatiniform and pale softening to be the result either of a merely chemical action of the gastro-intestinal fluids "which may commence before death, but which is chiefly exerted in the interval between the fatal event and the autopsy;" or to be a result of inflammation, or of one of the diacrises (diseases of the secretory function).

I desire particularly to call the attention of the reader to the fact, that, though I am about to describe gastritis and its various lesions, as a separate disease, it is, in by very much the larger number of cases, combined with simultaneous disease of the intestinal tube. It may be doubted, indeed, whether it would not be wiser to treat of the inflammatory affections of the whole alimentary canal under a single head,—a system towards which most recent writers seem to be tending. And yet the student and young practitioner will probably, in the end, obtain a clearer idea of these complex and but ill-understood diseases by the plan I am pursuing, which is the same as that followed in the second edition of this work.

Definition; Frequency.—By the term gastritis is meant inflammation of the mucous coat of the stomach. It appears, by the consent of all, to be of rare occurrence as an idiopathic affection in children. M. Valleix (t. v. p. 80) says, "We must conclude, therefore, that if gastritis occur in children, it is at least much more rare than in adults." The author refers, in the above quotation, to the idiopathic form of the disease, which he regards as of rare occurrence, while he states that the secondary form is very frequent. MM. Rilliet and Barthez, in their second edition, treat of gastritis as a distinct disease under two titles, as grave primary gastritis, a very rare form of disease, and as gastritis caused by local irritants, and especially by the employment of certain remedial agents, mentioning particularly tartar emetic, kermes mineral, and croton oil (t. 1, p. 797 and p. 802). In the latter form of inflammation, they state that softening was rare. In the former, of which they cite only three examples, they mention pseudomembranous secretion and gangrene as present in one case, ulceration and perforation in the second, and inflammation, ulceration, and cicatrix in the third. They treat also of inflammation and softening of the gastric mucous membrane, at considerable length, in their chapters on the catarrhal diseases of the digestive canal, regarding them as the local expressions of a constitutional state rather than as a purely local affection. But of this, more hereafter. M. Bouchut says of the stomach (*Loc. cit.* p. 215), "This organ, which has been thought to play so great a part in the production of the diseases of children at the breast, does not at all deserve the attention bestowed upon it." And lastly, to conclude these citations of opinions, Dr. Chambers, in his recent work on digestion and its derangements, says (page 282) that "acute inflammation of the mucous membrane only in the stomach, except as a consequence of the ingestion of corrosive poison or boiling water, is a very rare disease. I must say I never saw a case I felt sure of; certainly never one confirmed by a post-mortem examination, where one of the above-named causes were not present. It is to be presumed, however, that when idiopathic gastritis makes its appearance, it will have the same aspect as that which arises from a mineral acid, arsenic, or hot water." On the same page he remarks that "local acute inflammation of the whole walls of the stomach, peritoneal, mucous, and fibrous together, is not a much more common disorder. I believe there are only two in the post-mortem examinations, of the ten years from 1841 to 1851, at St. George's Hospital; one a patient of the late Dr. Hope, and one of the late Dr. Macleod."

The numerous cases of gastric disorder, which have been for so many years regarded as dependent on more or less acute inflammatory states of the gastric mucous membrane, Dr. Chambers designates as catarrh of the stomach, when of the acute form, and as mucous flux, when of the chronic type.

After reading Dr. Chambers' work, which is most interesting and full of valuable practical suggestions, and the last edition of the work of MM. Rilliet and Barthez, I have had all my old notions of the pathology of the gastro-intestinal diseases greatly shaken, and was strongly tempted to adopt their views and classification. After much reflection, however, I have deemed it best to adhere to the plan that was pursued in the last edition of this work. Their views are, in many respects, so very novel, that to adopt them *in toto*, would be like starting quite afresh in this branch of medicine, and as the doctrines on these points are now in a kind of transition state, I prefer to wait until further observation and developments come to show whether they be founded in fact or not. Reformers are prone to go too far in the new track they may have discovered, and while I receive with gratitude the new light that has been thrown upon these subjects, it seems but prudent not to adopt without reserve the new views until time has proved them to be correct.

CAUSES.—The causes of gastritis and softening of the stomach are not well understood. The only ones which seem clearly ascertained, are the action of irritating substances, and particularly of active medical agents, introduced into the organ; the predisposing influence of certain diseases; the presence of disease in other parts of the alimentary canal; and the solvent action of the gastric juice after death in the production of softening. MM. Rilliet and Barthez state that, in their experience, one of the principal causes of gastric inflammation and softening was the application of energetic remedies to the gastro-intestinal mucous membrane, and particularly the use of tartar emetic potions continued for several days in succession. They also mention the use of kermes mineral and croton oil as having had the same effect. It is proper to state, however, that these effects almost always occurred when the disease for which the remedy was given was secondary, and very seldom when it was idiopathic.

The diseases in the course of which gastritis and softening of the stomach are most apt to occur are: cholera, entero-colitis, cerebral affections, especially tubercular and simple meningitis, and apoplexy; the eruptive fevers; and inflammations of the thoracic and abdominal organs.

Some observers assert that the softening, which is generally confined to the mucous coat, but which extends in some cases to the others also, is always the result of a cadaveric change. Thus, M. Bouchut is of opinion that "it is a consequence of the acidity of the fluids contained in the digestive tube of young children, and these are exceedingly acescent in the disease to which we refer" (entero-colitis). M. Valleix concludes that in a certain number of cases there exist signs of inflammation which cannot be mistaken, and that this very inflammation may perhaps favor cadaveric softening in the parts attacked (t. v, p. 144). Rilliet and Barthez speak of inflammatory softening, but remark that in a large number of cases the alteration ought to be regarded as cadaveric. Dr. Condie (*Dis. of Child.* p. 186, 2d ed.) says, "we are still convinced, from the result of our own observations, that the gelatinous softening so frequently observed in children that have died of acute gastritis, is invariably the effect of intense inflammation of the mucous and other tissues of the stomach." Dr. Carswell, as has already been stated, believes it to exist both as a consequence of inflammation and as a post-mortem change.

I believe that the indigestions of children are not unfrequently followed by slight gastritis, as I have often met with cases which have been followed by fever, nausea, or vomiting, anorexia, epigastric tenderness, and loss of digestive power for several days.

Age seems to exert but little influence on the production of gastritis, which occurs indifferently in very young and in older children, while softening is generally acknowledged to be much the most frequent in infants, and in children under six years of age.

ANATOMICAL LESIONS.—The pathological appearances in gastritis are redness, softening, thickening, ulceration, and the presence of pseudo-membranes upon the mucous membrane. Writers describe different forms of gastritis, according to the lesions found after death. The most important of these are the erythematous, pseudo-membranous, and ulcerative. The first of these, the erythematous, is characterized by redness, softening, and thickening of the mucous membrane. The redness, which is one of the most important features, may exist in the form of vascular arborizations, ecchymoses, or uniform coloration of a rosy, deep-red, brownish-red, or purple tint. Softening is thought by MM. Rilliet and Barthez to be almost as important a sign of inflammation as redness, though they state that it may exist independently of inflammation. In most cases of erythematous gastritis, the softening is such that the mucous membrane may be removed with very slight force, and that it will yield no strips; while in those which are very severe, the least scratch reduces the membrane to a pulp, and leaves the submucous tissue exposed. When thickening is present it generally affects several neighboring points simultaneously, which project somewhat above the healthy tissue, and give to the inner surface of the organ a rough and unequal appearance, quite different from its ordinary smoothness and polish. In some few cases the thickening implicates the submucous coat also, which becomes fibrous and resisting.

The pseudo-membranous form of gastritis presents little whitish portions of false membrane, which are smooth, polished, and of an irregular shape, or thin, soft, rough, of a more or less deep yellow color, and which, isolated and distant from each other at first, become more abundant and extensive, and at last cover nearly the whole diameter of the organ. They are but slightly adherent to the mucous surface beneath.

The ulcerative form of the disease is not a rare affection: it occurs in two varieties; one in which the ulcerations affect the follicles of the stomach, and the other in which the mucous membrane itself is ulcerated. The pathological lesions of the former variety will be fully treated of in the article on entero-colitis, and I shall therefore confine my remarks entirely to the latter variety. The ulcerations of the mucous membrane are of a circular or oval shape, or they occur in winding lines of various lengths, of from a third of a line to a line in width. The circular and oval ulcerations, are of various sizes, from the head of a pin to that of a small bean; the smaller ones affect generally, but not always, the whole thickness of the mucous membrane, so that they rest on the submucous tissue, while the larger implicate the submucous tissue also, and therefore rest on the muscular coat. The edges of the winding ulcerations are usually soft, and sometimes redder than the rest of the mucous membrane, whilst their depth is formed of the submucous tissue, and is of a grayish-white color. At a more advanced stage, they increase both in length and breadth, unite after a time at their edges or extremities, and at last form extensive ulcerations, in the midst of which are seen small portions of softened and reddened mucous membrane. The ulcerations of this form do not extend to the submucous tissue, which, on the contrary, is generally thickened.

I have next to describe softening of the stomach, which has been erected into a special and distinct disease, and about the true nature of which there is much discussion; for while, as we have already seen, some observers assert it to be the result of acute inflammation, others ascribe it entirely to a post-mortem chemical action of the fluids contained in the stomach, or to some lesion of the nerves of the organ. In regard to this vexed question, I can merely express an opinion formed from the study of some of the best authorities upon the subject. That a large number of the cases of softening depend on cadaveric change, will not, it seems to me, admit of doubt. That some are the consequences of inflammation is, I think, equally clear; whether the inflammation be the immediate cause, or whether, as M. Valleix surmises, it merely predisposes the tissues of the stomach to be more readily acted upon by the fluids which it contains. Whether there be a third set of cases which should be regarded as forming a distinct disease, in which the softening depends on some peculiar unknown condition of the organ, independent, however, of inflammation or of a chemical action of the gastric juice, seems to me very doubtful, and certainly far from being proved in the present state of knowledge on the point.

Dr. Carswell (*Loc. cit.* p. 14) describes softening from inflammation as presenting various degrees. It may be such that the mucous membrane breaks as soon as it is seized between the fingers or forceps; in the second degree, the edge of a scalpel or the finger passed lightly over it, converts it into a soft, somewhat opaque, creamy-looking pulp; in the third and last degree, a stream of water a few inches in height carries it away. The softened portions may be quite pale, or they may present various shades of redness. The redness may be confined to the softened part, or extend to the neighboring portions, and may vary from a light rosy, bright or dark red, to a purple or brown tint. In pale inflammatory softening, the color may be pale gray, or yellow, very much like the natural tint, or paler than usual. Dr. Carswell does not believe that inflammatory softening extends from the mucous to the other coats of the organ, so as to produce perforation. He states, on the contrary, that the kind of softening which occasions that accident depends on the chemical action of the gastric juice.

Dr. Carswell describes the appearances of post-mortem softening. The softening is generally met with in the fundus of the organ; its degree varies between a slight diminution of the consistence of the tissues, and one in which the mucous membrane resembles a quantity of albumen covering the submucous coat; the softened portion is generally very pale and transparent. The principal distinction between inflammatory and post-mortem softening, is, that in the former the mucous membrane, "instead of being transparent, is more or less opaque, and even when it is completely disorganized, it resembles a mixture of flour and water, or milk, rather than an albuminous or gelatinous fluid. Such is, in fact, the principal character of inflammatory softening of the mucous membrane in whatever organ it occurs; whereas the transparent gelatiniform softening is never observed except where the chemical agent is formed by which it is produced, viz., in the alimentary canal, and in some of the neighboring organs, for the reasons which we have already given."

The gelatiniform softening, which is that described by M. Cruveilhier as a disease peculiar to children, and which reduces the mucous membrane and sometimes all the other tissues of the stomach to the consistence of mucus or jelly nearly transparent in character, is, as we have just seen, supposed by Dr. Carswell to be invariably the result of post-mortem changes. MM. Rilliet and Barthez, on the contrary (*Loc. cit.* t. i, p. 451), while they state that this form of the lesion scarcely ever coincides with inflammation in the same patient, surmise that it may have followed inflammation, though at the time of death all appearances of the latter have perhaps disappeared. They add, however, that "it is probable that softening, particularly the gelatiniform, may commence as such, but of this we have no proof."

Symptoms.—It is very difficult to give an accurate account of the symptoms of inflammation and softening of the stomach, for the following reasons: they have not as yet been studied with a sufficient degree of care; they are, as was stated in the early portion of this article, rarely idiopathic, but almost always secondary affections in the course of other maladies; the symptoms which betray them resemble so closely those of intestinal diseases, as to make it very difficult, if not impossible, to draw a distinction between the two; and lastly, in the great majority of cases, gastric complaints coexist with intestinal.

The most important symptoms are vomiting, diarrhœa, loss of appetite, thirst, epigastric tenderness, sometimes tension of the abdomen, and slight febrile reaction.

Vomiting is the most important of the different symptoms of gastritis. It is not, however, according to MM. Rilliet and Barthez, invariably present. It was observed by them particularly in cases following the administration of active remedies, while in those which occurred spontaneously, it was much less common. It shows itself especially after the taking of food or drink. Sometimes when the stomach is empty, there is simply nausea and retching. In severe cases the vomiting is frequent, and accompanied by violent straining and pain. *Diarrhœa* exists in most cases, whether the attack be one of simple gastritis, or accompanied with enteritis. The *appetite* is generally lost or greatly diminished. *Thirst* is commonly acute, and often intense. The *tongue* is described by some writers as being generally red, and sometimes smooth and glazed. The authors above quoted, state, on the contrary, that it presents nothing peculiar in most cases. It was generally moist, only slightly colored, covered with a white or yellow coat of variable thickness, and in some rare instances, red on the edges and tip, or gluey, or even dry and harsh. As a general rule, the *abdomen* is normal, according to the same authors, though in some cases there is more or less swelling and tension. According to most writers there is generally tenderness on pressure in the epigastrium. Infants and young children are commonly restless and uneasy, as though in more or less pain, while those who are older complain of burning in the region of the stomach. It is well to remark that MM. Rilliet and Barthez state that tenderness on pressure often exists, not at the epigastrium, but in one of the iliac fossæ, or at the umbilicus, even when the stomach alone is inflamed. The condition of the circulation, and indeed all the symptoms, depend so much upon the nature of the concomitant malady, that it is difficult to ascertain what are their real characters in simple gastritis. Most writers agree that *fever* usually accompanies the disease, and that it is commonly of the remittent type. It is certain, however, from other observations, that it is not always present.

In very violent cases there are added to the symptoms just described, those indicative of an adynamic state of the nervous system :—prostration, cool or cold skin, with perspiration; weak, rapid pulse; singultus; sometimes convulsions, and death. The symptoms which have just been detailed as indicating the presence of gastritis, do not generally exist alone. They are much more frequently than not associated with other symptoms, which show the presence of intestinal disease in the form either of simple or inflammatory diarrhœa. That they do sometimes, however, exist alone, and that, too, independently of the action of irritating drugs, or of corrosive poisons, I cannot myself doubt, since I have several times seen them follow attacks of simple indigestion. In such cases, I have met with all the symptoms usually supposed to indicate an inflamed state of the gastric mucous membrane,—repeated and obstinate vomiting, epigastric tenderness, entire loss of appetite, and more or less acute fever. I have, to be sure, never seen a post-mortem examination of such a case, for I have never yet known one to prove fatal. Whether we call such an attack gastritis, acute catarrh of the stomach, or *embarras gastrique,* matters not much. It is the condition which has long been looked upon as indicating an inflammatory state of the gastric mucous membrane, and until we have more positive evidence than has yet been adduced, that inflammation has nothing to do with it, I shall deem it best to retain the old title.

DIAGNOSIS AND PROGNOSIS.—The *diagnosis* must rest chiefly on the existence and frequency of vomiting; on the presence of epigastric pain or tenderness, of swelling and tension of the abdomen, and excessive thirst; and on the absence of other disease which might account for the illness of the child. It is not possible, in the present state of knowledge, to draw a distinction between inflammation and softening, since, as we have seen, the symptoms of the two conditions are the same.

The *prognosis* will depend on the severity of the gastric and constitutional symptoms, and on that of the concomitant disease, when the attack is secondary. When there is incessant and obstinate vomiting, so that not even water in small quantities can be retained after several hours of sickness, when the tongue is red and glazed, or dry and brown, and when adynamic symptoms make their appearance, and emaciation makes rapid progress, it is much to be feared that extensive softening has taken place, and that the case will prove fatal.

TREATMENT.—The two most important points in the treatment are the withdrawal of the causes that may have produced, or may tend to keep up the disease, if these can be detected, and strict attention to diet. Whenever, therefore, the symptoms have made their appearance after the exhibition of powerful drugs, as tartar emetic, ipecacuanha, or cathartics, their use ought to be instantly suspended. The child should be put on the strictest diet. If at the breast, it must be allowed to nurse only at rare intervals, and to take but little at a time. If fed on artificial diet, it should be restricted to barley or arrow-root water, to very weak milk and water, or to small quantities of milk diluted with lime-water, in the proportion of a third or a half of the latter. This is one of Dr. Chambers' favorite prescriptions, and is an admirable one. Nothing solid and no rich liquid nourishment ought to be allowed, unless the child is in a state of weakness and debility from previous or concomitant disease, such as to make it absolutely necessary to endeavor to maintain its strength. Billard even recommends that the child be sustained by means of nutritive enemata, consisting of farinaceous substances, while the digestive function is allowed a total rest.

Antiphlogistics are useful and proper when the disease occurs in a strong and healthy child, when it is associated with fever, and when there is nothing in the nature of the accompanying disease, if it be a secondary case, to prevent their employment. The most suitable mode of depletion is by leeches, which should be applied to the epigastrium. It is best to take but a very moderate quantity of blood, for fear of exhausting the patient. After the use of the antiphlogistic remedy, a warm bath will be found of great service in moderating the heat of the skin and rendering the child more comfortable. Small pieces of ice ought to be put into the mouth occasionally, as a refrigerant, or small quantities of iced drinks may be allowed from time to time. As soon as the bleeding from the leech-bites, if leeches have been employed, has ceased, a warm light mush poultice to the epigastrium is a valuable and useful remedy. Some writers recommend the use of blisters to the epigastrium. I should much prefer a warm poultice or the occasional application of a mustard poultice. Dr. Condie recommends small doses of calomel, from a quarter to half a grain every hour or two hours. *Opiates* are useful in allaying nausea and vomiting, and appear to exert a favorable influence on the progress of the disease.

When vomiting is frequent and troublesome, it may generally be allayed by the administration of lime-water and milk, given in teaspoonful quantities, every fifteen minutes or half hour; by observing the precaution of allowing the food and drink to be given only in the smallest quantities (from a teaspoonful to a tablespoonful), and at considerable intervals; by the application of warm cataplasms over the abdomen, or a spice-plaster to the epigastrium; or, lastly, by the exhibition of a few drops of laudanum, or paregoric, to be repeated if necessary. If the child becomes weak and exhausted, with coolness and abundant moisture upon the limbs, we must resort to the administration of some kind of stimulant. The best is weak brandy and water, given in very small quantities; or we may employ wine-whey, or milk punch, or the aromatic spirits of hartshorn.

ARTICLE II.

ENTERO-COLITIS, OR INFLAMMATORY DIARRHŒA.

General Remarks.—In treating of inflammation of the intestinal tube, I shall combine under one article inflammation of the large and small intestine, inasmuch as it appears from the researches of different observers that they coincide in the majority of cases. It would seem from the statements of Billard, that it is not unusual to meet with enteritis alone in the first year of life, for of 80 cases of inflammation of the intestinal tube, during that age, carefully observed by him, there were 36 of enteritis; 30 of entero-colitis; and 14 only of colitis. Bouchut, on the contrary (*Loc. cit.* p. 210), says that entero-colitis is almost peculiar to young infants. He adds that the principal morbid alterations of the disease are found in the large intestine, and, by extension, in the termination of the small intestine.

MM. Rilliet and Barthez, as has already been stated, adopt, in their second edition, different views and a different nomenclature of the intestinal diseases from those which they made use of in their first publication. The old title of entero-colitis is entirely dropped, and we have instead the terms acute and chronic catarrh and catarrhal inflammations of the intestines, choleriform and ataxic catarrh, and typhoid enteritis. The account of the anatomical alterations is, however, almost identically the same. At page 690 of the first volume of the second edition, we find, under the head of general conclusions, the following statements: "The various lesions of the different parts of the digestive tube, which we have just described, may exist singly in each, or simultaneously in several; and hence arise relations which it will be useful to signalize.

"The lesions of the large intestine are so very common that it is not surprising to see them coincide most generally with those of other parts of the digestive tube. Nevertheless, we find the stomach not rarely affected alone; the lesions which it then presents are exceedingly various, and there is no particular one found isolated more frequently than another. In the same way, when the stomach is affected simultaneously with the intestines, the lesions are not unfrequently independent of each other, and of very different kinds.

"Thus we have observed acute gastritis with softenings of the digestive tube, and reciprocally softenings of the stomach with acute or chronic entero-colitis, of the mild or severe form. In other cases, disease exists only in the two extremities of the digestive tube; the stomach and rectum are alone affected.

"No fixed rule therefore unites the lesions of the stomach to those of the digestive tube. But there are a good many circumstances in which the same causes act upon several points at the same time; then we find:

"1. Gastro-duodenitis: pathological anatomy rarely exhibits this condition.

"2. It is not so of gastro-enteritis and gastro-colitis, which are quite frequently met with, but which post-mortem examination has seldom shown us to be primary.

"3. We find, also, softening of different kinds implicating the whole digestive tube from the cardia to the anus; and while cases of this kind are rare, they are not the less really met with. We shall have occasion to cite some examples. More generally this alteration is partial, occupying a portion of the stomach, or one or the other intestine only."

At page 693 they state that it is only exceptionally that the small intestine presents the dominant lesions, whilst "the large intestine is, on the contrary, of all parts of the digestive tube, the one which is at the same time the most frequently and the most severely affected."

M. Legendre (*Bibliothèque du Méd. Prat.* t. v, p. 649), found the large intestine alone diseased in 9 of 28 cases of diarrhœa, while of the alterations of the small intestines he says (p. 652), "Never isolated, but always united with similar lesions of the large intestine, these alterations are, in general, less serious than those found in the lower portion of the digestive tube."

Another motive for describing the diseases of the intestinal tube under one head, is the difficulty, not to say impossibility, of recognizing during life the affections of its different portions. Billard (p. 428), recognizes this difficulty, for he says: "In consequence of the impossibility we have found to exist of tracing with exactitude the series of symptoms proper to inflammation of the different portions of the digestive tube, we shall content ourselves with presenting an analytical sketch of the causes, symptoms, and ordinary course of inflammation of the mucous membrane of the intestines in general." MM. Rilliet and Barthez also describe enteritis and colitis together, under the title of catarrh, and catarrhal inflammation of the intestines, and M. Bouchut under that of entero-colitis.

Writers make several divisions or forms of disease of the intestinal mucous membrane. Of these, the most important are the erythematous, pseudo-membranous, and follicular inflammations, and softening, and gangrene. The whole subject is involved in much obscurity, in consequence of the variety of the lesions, and the different views as to their nature, which have been adopted by different authors. The follicular form of disease particularly, has given rise to a great deal of discussion, some asserting that it is not an inflammation, but a simple functional derangement of the secretory apparatus of the bowel, while others as strenuously maintain its inflammatory nature. In the present article, I shall, under the title of Entero-colitis, devote particular attention to the erythematous and follicular forms of inflammation, and to softening of the mucous coat of the bowels: the pseudo-membranous form of inflammation and gangrene are rarely met with, and are therefore of much less importance.

, **Definition; Synonymes; Frequency; Forms.**—By the term entero-colitis is meant inflammation with its attendant lesions, ulceration, softening, thickening, pseudo-membranous exudation, and gangrene, of the intestinal mucous membrane.

Under this title I shall describe the different kinds of diarrhœa treated of by Underwood, Eberle, and Dewees, under the titles of bilious, mucous, and chronic diarrhœa, and by Dr. John Cheyne (*Essays on Dis. of Chil-*

dren; Edinburgh, 1801–2), under that of Atrophia Ablactatorum or Weaning-brash.

Entero-colitis is one of the most frequent of children's diseases. During the five years from 1844 to 1848, inclusive, there were 4204 deaths from diseases of the digestive organs in this city, including amongst these, diarrhœa, dysentery, cholera infantum, inflammation of the stomach and bowels, marasmus, aphthæ, worms, colic, and various other affections of the stomach and bowels. Of the 4204, 2717 were from diarrhœa, dysentery, cholera infantum, and inflammation of the stomach and bowels, and as entero-colitis exists in by far the greater part of these diseases, we may understand how extremely frequent an affection it is. The deaths from affections of the digestive organs during the period referred to, constituted not quite a fourth of the whole mortality under fifteen years of age; whilst those from diseases of the nervous system were rather less in number, and those from diseases of the respiratory organs rather more than a fifth. It appears, indeed, that entero-colitis, in the form of diarrhœa, dysentery, cholera infantum, or what is called in the bills of mortality, inflammation of the stomach and intestines, is by far the most fatal disease of childhood. We may appreciate yet more accurately the importance and frequency of the disease, by reference to the statements of MM. Rilliet and Barthez, who say (1ère édit. t. i, p. 483), that, taking into consideration all the cases they observed, including tubercular cases, they find that of every two children that die, one presents a more or less serious lesion of the large intestine. They add: "If it be recollected that this holds true particularly in regard to younger children, it will be seen that it is rare for a child to die between two and five years of age, without having either colitis or softening of the large intestine." Bouchut states that entero-colitis is one of the most dangerous affections of children at the breast: "It is the most common of all those incident to that age." (p. 210.)

I shall describe two forms of the disease, the *acute* and *chronic.* The acute form is accompanied by active and inflammatory symptoms from the first, and runs its course in a few days or weeks; the chronic form is unaccompanied by acute symptoms, and lasts several weeks or months.

CAUSES.—The most frequent cause of enteritis in infants, the one most clearly and positively ascertained, is *improper alimentation.* This may consist either of an unhealthy milk of the nurse, or, what is much more common, improper artificial nutriment. The kind of food most apt to produce the effect, is one composed exclusively or in considerable proportion of some of the feculent substances, which constitute so large a portion of the diet of children throughout the civilized world. To prove the truth of this assertion it is only necessary to quote the opinions of those who have most carefully studied the subject. M. Valleix (*Guide du Méd. Prat.* t. iv, p. 60, 61, and *Bulletin Gén. de Therap.*, article Acute Enteritis of Adults and New-born Children, March, 1845) clearly asserts that the most frequent cause of muguet, which he believes to be essentially connected with enteritis, is a too exclusively feculent alimentation. In the article last cited, while speaking of the great importance of this cause, he says: "What proves that my assertion is not hypothetical is, first, that all the deaths from enteritis in children that I have seen occurred in those who had been placed upon this kind of regimen, and second, that the disease did not occur in any of those observed by me in private practice, for whom I had directed an exclusively milk diet up to four, five, or six months of age." He adds that M. Trousseau has arrived at similar opinions, after studying the same diseases at the Necker Hospital; and that he, on account of the danger of a system of diet disproportioned to the digestive powers, recommends that children be confined almost exclusively to the breast until after the first dentition is completed. Barrier, speaking of the follicular diacrisis (*Loc. cit.* t. ii, p. 40), states that the artificial food given to children at the period of weaning is a frequent cause of the affection, and that of all the different kinds of food habitually employed at that period, feculent substances are the most injurious. I have, myself, frequently known entero-colitis to follow the employment of artificial diet, either alone, at the period of weaning, or in children who were partly nursed. Children fed wholly on artificial diet from birth, rarely escape, according to my experience, attacks of the disease, which in many prove fatal. I have, on several occasions, seen children recover rapidly from the disease, after suffering more or less for weeks, by the suspension of a diet consisting wholly or in too large proportion of farinaceous materials, and the substitution of one composed of milk and cream, prepared with gelatine, and containing a very small quantity of arrow-root, rice, or wheat flour. (See *article on thrush*, page 267.) It is not merely the quality, but the quantity also of artificial food that proves injurious to infants. Over-feeding has always been recognized as a fruitful source of bowel complaints in early life. Another cause is the preparation of the food in too thick and rich a manner, thereby overtasking the stomach, intended during the early months to receive only the thin milk supplied by nature. The custom, therefore, of feeding infants on thick oatmeal gruel, with but little or no milk, on what is called cracker victuals (pounded crackers with water and sugar, or milk), on thick bread and milk, on preparations of rice of too solid a nature, or indeed, on any kind of diet not consisting chiefly of milk, and in which feculent substances enter merely as secondary constituents, may safely be asserted to be the most frequent cause of the disease under consideration.

An unhealthy character of the milk of the nurse is also known to be a cause both of simple diarrhœa and entero-colitis. When the granules which exist as a physiological element in the colostrum secreted during the first few days after childbirth, continue to be secreted after that period, the infant is almost certain to suffer from entero-colitis, and not unfrequently to die, unless weaned or transferred to another nurse. It is said, also, that when the mammary secretion is acid, instead of alkaline, when it contains mucus or pus globules, when the nurse is liable to vivid moral emotions of any kind, or when addicted to intemperance, the child is very apt to suffer either from the disease under consideration, or from simple diarrhœa.

After the causes just enumerated, the one which appears to exert the strongest influence is *dentition*. That the evolution of the teeth, though a physiological process, is a powerful predisposing cause of diarrhœa and enteritis, cannot be doubted at the present time. It is one recognized by many of the most able writers and observers of the day, and by most practitioners. MM. Rilliet and Barthez agree with Trousseau in the opinion that the simple diarrhœa so apt to occur in children at the epoch of the first dentition, is often the origin of chronic intestinal lesions which finally reduce them to extreme debility and emaciation. They say that careful investigation will generally show that nearly all the cases of inflammation and softening date either from the epoch of dentition, from the period of weaning, or from the time at which some considerable change in the character of the regimen was made. M. Bouchut states that of 110 children in whom the first dentition was going on, 26 escaped any indisposition, 38 suffered from restlessness, colics, and occasional diarrhœa, so mild as to excite no alarm in the parents, whilst 46 had abundant diarrhœa. In 19 of the last series it appeared coincidently with the fluxion of the gums, occurring at the time of emergence of each tooth, and disappearing entirely in the intervals; in the remaining 28, in all of which the process of dentition was difficult, the diarrhœa persisted and gradually assumed the characters of entero-colitis. M. Legendre and M. Barrier (*Loc. cit.*) both agree in ascribing very great effect to the influence of dentition in the production of diarrhœa and entero-colitis. The former asserts the diseases referred to to be much the most frequent between the ages of six or seven months, and two or two and a half years, which includes exactly the period occupied in the first dentition, while they are only met with exceptionally after three years of age.

The act of weaning is very apt to result in the production either of simple diarrhœa or entero-colitis, in consequence, no doubt, of the irritation set up in the gastro-intestinal surface, by the change of food made at the time. The diarrhœa which occurs at this period was formerly, and is still, not unfrequently, called *weaning-brash*. Dr. Stokes (*Cyclop. of Med.* Art. Enteritis) says of this disease that it "is manifestly an acute enteritis, produced by the change of food, and in which nature seeks to relieve the inflammation by a supersecretion."

We may conclude, therefore, in the words of Rilliet and Barthez (1ère édit. t. i, p. 541), "that the greater number of cases of entero-colitis in young children are caused by dentition, weaning, and any very sudden change of regimen or other hygienic conditions."

Various other causes are cited by writers. Amongst the most important are excessive heat at certain seasons; unfavorable hygienic conditions as to habitation, ventilation, clothing, cleanliness, and want of exposure to the air; the existence of certain diseases; and a lymphatic constitution, or one debilitated and exhausted by any cause.

That heat of weather acts as a predisposing cause to entero-colitis and diarrhœa, is clearly shown by the fact of the much greater prevalence of these diseases, and particularly of cholera infantum or summer complaint, during the three summer months. M. Valleix has shown, also, that the acute enteritis of new-born children is much more prevalent during the warm, than the cold season of the year.

It is scarcely necessary to do more than state the fact that the unfavorable hygienic conditions above referred to, act as predisposing causes to the disease. This is clearly shown to be true by the evidence of many writers, and by the very extensive prevalence and great fatality of the affection in hospitals, and amongst the children of the destitute classes of society in cities and towns.

Entero-colitis is prone to occur as a secondary affection in many of the acute diseases of children. It is by far the most common in the course of the eruptive fevers, particularly measles, and in that of typhoid fever. It is also a frequent complication of the latter stages of pneumonia.

That children of feeble constitution and lymphatic temperament are more disposed to the disease than others, is sufficiently proved by the evidence of various observers. Lastly, that the incautious and excessive use of perturbing systems of medication, addressed to the digestive tube, often occasions diarrhœa and entero-colitis, is fully proved by the researches of MM. Rilliet and Barthez, and by my personal experience.

Anatomical Lesions.—It has already been stated that the alterations of the large intestine are, as a rule, much more frequent and serious than those of the small intestine. It appears from the researches of MM. Rilliet and Barthez, and Legendre, that enteritis rarely exists alone, whilst colitis, by itself, or combined with enteritis, is quite frequent. M. Legendre states that inflammation of the small intestines never occurs without corresponding lesions of the large bowel, while in 28 cases of diarrhœa, he found the large intestine alone diseased in 9. From a table of different intestinal lesions, given by MM. Rilliet and Barthez (2ème édit. t. i, p. 692), it appears that they have met with 45 cases of erythematous, pseudo-membranous, ulcerative, or pustular enteritis; with 113 of the same forms of colitis; with 90 of follicular enteritis; 64 of follicular colitis; and with 28 of softening of the small, and 35 of softening of the large intestine. It seems clearly established, therefore, that inflammation of the large is considerably more frequent than that of the small intestine, and much more apt to exist alone.

It has already been stated that my remarks would be confined chiefly to the erythematous and follicular forms of inflammation, and to softening of the intestines. But even here we are met by a difficulty, since some writers confound the two forms of inflammation together, and regard them merely as different degrees of the same alteration. Such is the view taken by the English authors that I have consulted, and by MM. Legendre and Bouchut. MM. Rilliet and Barthez, on the contrary, describe the anatomical lesions of the two forms separately, with great care, but confound them together in their description of the symptoms. Barrier, as we have already seen, makes of the follicular form a disease altogether different from ordinary inflammation, and calls it follicular diacrisis. For my own part, I am strongly disposed to believe that erythematous and follicular inflammation, and softening of the intestinal mucous membrane, are, as asserted by Legendre and Bouchut, and by some English writers, merely different degrees of the same disease. That they very often coincide in the same individual is proved by the observations of different authors, and particularly by those of MM. Rilliet and Barthez, who have given a table of 185 autopsies (*Loc. cit.* p. 692), showing the exact manner in which they are united in the same individual. From this table it appears that of the whole number, there were only 2 cases of enteritis, 32 of colitis, 11 of entero-colitis, 12 of follicular enteritis, 3 of follicular colitis, and 13 of follicular entero-colitis, existing each alone, uncombined with other lesions; there were also 18 cases of softening of the small or large intestine without other alterations; while the remaining cases, 97 in number, consisted of the different lesions enumerated, variously combined in the same individual.

Inasmuch, however, as the relation of the two forms to each other is not as yet fully determined, and as a separate description will be more accurate than one in which the two are mingled together, I shall adopt the former plan, stating, however, the fact, which is acknowleged by all, though variously interpreted, that they very often coexist in the same individual.

Erythematous inflammation is generally slight, both in degree and extent, in the small intestine. In some few cases it is general, and then appears in the form of redness produced by arborizations. In other instances it appears in spots of more or less vivid inflammation, which may extend throughout the small intestine, or be limited to certain portions. Though sometimes confined to the upper part of the bowel, constituting duodenitis, it is much more apt to exist in the lower part of the ileum, where it generally assumes more serious characters than above. At the latter point it appears in the form of more or less bright injection with tumefaction, and sometimes softening of the mucous membrane.

The large intestine is generally contracted and lessened in size, according to Bouchut. This condition is mentioned also by Dr. Cheyne, in his remarks on atrophia ablactatorum (*Loc. cit.*), and by Dr. Eberle as existing in a case examined by himself (*Loc. cit.* p. 239), in which he found the whole length of the colon contracted to a size that scarcely admitted the little finger. The erythematous inflammation generally presents itself in the shape of arborizations or spots, and seldom of bands. The inflammation is generally most acute in the cæcum, descending colon, and rectum, particularly the latter, where it often assumes great severity. The color of the mucous membrane varies from a pale rosy to a deep scarlet tint, which is either uniform, and dependent on minute injection of the capillaries, or which in some cases affects only the summits of the folds of the mucous tissue. The mucous membrane is often thickened, and still more frequently softened. Of the latter alteration, however, I shall speak after a time; while of ulceration, which is still more common, notice will be taken under the head of the follicular form of the disease.

Follicular Inflammation.—The follicular apparatus of the intestinal tube consists of isolated and agminated glands. The isolated follicles are abundant in the stomach, and exist throughout the length of the intestinal tract. They are most abundant in the superior and inferior portions of the small intestine, less so in the middle, and numerous again in the large intestine, particularly the rectum. The agminated follicles, as is well known, are found chiefly in the ileum along the free edge of the intestine, and become more and more numerous as we approach the cæcum. The isolated follicles are not very distinct in their normal condition, but undergo various changes when affected with disease. M. Gendrin (*Trait. Philosophique de la Méd. Prat.* t. iii, p. 6) says that they are scarcely so large in their normal condition as the head of a small pin, and that they consist of little white bodies, upon which we can rarely distinguish with the naked eye, but always with a lens, a grayish point, which is the excretory orifice. He distinguishes the crypts into simple and compound. The simple have just been described; the compound are formed of an agglomeration of several simple crypts or cryptiform granulations, having a common reservoir and excretory canal. It must be observed that he does not mean by the compound crypts, the glands of Peyer, which he elsewhere describes under the title of cryptous plaques. He states that the simple crypts are found in the stomach, especially the pyloric half and along the great curvature, in the duodenum, and in the jejunum, in such quantities that they seem to be almost confluent. As we descend into the ileum they become larger and less frequent. They are rare in the large intestine, where instead of them are found the compound crypts, which are there very numerous. The latter exist also in the stomach and duodenum, but are rare in the small intestine.

The alterations of the follicular apparatus of the gastro-intestinal mucous membrane, constituting the follicular inflammation of several writers, may be referred to under two heads, first, increased development without apparent inflammation, and second, inflammation, with or without disorganization.

The first condition, or that of increased development without evident inflammation, presents the following characters. The isolated glands have become enlarged, and seem therefore more numerous than in the healthy condition; they appear in the form of lenticular grains seated in the texture of the mucous membrane, sometimes projecting from its surface, sometimes not, and in other instances appearing to be situated beneath it; the excretory orifices of the glands are often enlarged and tumid, and easily distinguished under the form of a grayish or blackish point in the middle of the gland; in other cases the orifices cannot be distinguished until slight pressure is made upon the crypts, when a drop of mucus may be seen exuding through the open point. The color of the follicles in this condition is dull white, rosy, or yellowish; they are generally from a third to two-thirds of a line in diameter. Dr. Horner (*Am. Jour. Med. Sci.* Feb. 1829) speaks of them in this state of development as resembling "small grains of white sand sprinkled over the mucous membrane, and about the size of a millet seed."

The agminated glands or plaques of Peyer are found in the same state of increased development. They are tumefied; they project above the level of the surrounding mucous membrane, and are evidently enlarged, without, however, always presenting evidences of inflammation.

M. Barrier describes another condition of the follicles, which is met with chiefly in the large intestine. This is an enlargement of the orifice of the gland, which will easily receive a small probe, and sometimes measures near half a line in diameter. This dilated orifice, which might readily be mistaken for an ulceration, leads into a little cavity, which is the follicular sac itself.

Authors are very much divided as to whether the alterations of the follicles just described ought to be regarded as the result of inflammatory action or not. Billard says it is not of "evident inflammatory nature;" and in another place, that he does not consider it a "frank inflammation of the muciparous follicles," but as "a degree intermediate between the normal and inflammatory state." M. Barrier, on the contrary, says that these alterations are evidently not of an inflammatory nature, and that they do not entitle the disease to the name of gastro-enteritis or colitis. He, therefore, follows M. Gendrin, and expresses the condition in which they occur, by the word *diacrisis*, or altered secretion.

MM. Rilliet and Barthez, in their second edition, after discussing very ably and at much length the opinions of MM. Barrier and Legendre, and of MM. Friedleben and Flesch, say (t. i, p. 712): "But we confess that we are unable to attach any very great importance to the solution of the different questions raised by MM. Legendre, Barrier, Friedleben, and Flesch. Whether the acute or chronic lesion of the follicular apparatus be primary and inflammatory, as MM. Friedleben and Flesch think, or whether the disease consists at first in a simple lesion of secretion, and the inflammatory lesions be only the consequence of the diarrhœal flux, as M. Legendre supposes, seems to us of slight importance. These diseases are not the less the same as regards their etiology and symptomatology. Is there, indeed, any very great difference between a follicle that is turgescent under the influence of a very high functional activity, and a follicle that is really inflamed? Has not Billard already answered this question, when he admits this turgescence to be a degree intermediate between inflammation and the normal state? We have ranged ourselves upon the side of his opinion from perceiving only a difference of degree and of form between diseases identical in all respects, saving sometimes in an anatomical point of view; wherefore, without concerning ourselves more with these ideas, we proceed to develop our opinion upon the nature of the different gastro-intestinal diseases.

"We believe that, under the influence of anti-hygienic causes, which are the foundation of nearly all the gastro-intestinal affections, acute or chronic, primary, and even secondary, of infancy, there arises an alteration of the whole economy, and of the blood in particular, which, in its turn, becomes the cause of the intestinal disease, and of the secondary accidents following in its train.

"The variety in the intensity of the anatomical alterations, and the absence even of these lesions, are thus readily explained by the suffering of the entire organism (*totius substantiæ*), by the greater or less modification of the fluids, and by the more or less energetic resistance of the digestive apparatus to the destructive influence of this cause."

The authors of the *Bibliothèque du Médecin Praticien* (t. v, p. 657), state that it cannot be doubted that inflammation plays some part in the anatomical alterations of the secretory apparatus of the digestive tube just described, and of those we shall speak directly. For my own part, I am clearly of opinion that they are in all probability the first stage of inflammation; for, as we shall presently see, when the condition persists for some length of time, the follicles almost invariably become ulcerated and surrounded by patches of inflammation, and though it is possible, as M. Legendre supposes, that the surrounding inflammation may be the result of ulceration of the crypts, it is difficult to understand how that ulceration could occur independently of inflammation.

The other changes we have to notice are evident inflammation and ulceration of the follicles. M. Legendre (*Biblioth. du Méd. Prat.* t. v, p. 650) says, that after the morbid development of the follicles (which he calls the first degree or stage of disease) has existed for some time, if the causes which produced it continue in action, the alteration becomes the point of departure of numerous ulcerations, which are deeper in proportion to their time of duration. The researches of the French observers prove that the alterations, and particularly the ulcerations of the follicles, are more frequent and occur to a greater extent in the large than in the small intestine. M. Legendre states that in 28 cases of diarrhœa, he found the large intestine alone diseased in 9; while of the small intestine he says, that the morbid modifications of its follicular apparatus never occurred alone, but were always combined with similar lesions of the large bowel, and, moreover, were generally less considerable than those of the latter: from these circumstances he is led to infer that in chronic diarrhœa, the small intestine is last attacked. A reference to the dissections of Dr. Horner, and especially to those of Dr. Hallowell (*Am. Journ. Med. Sci.* July, 1847), will show that these statements as to the seat of the follicular lesions hold good also in regard to cholera infantum.

I shall first describe the ulcerations as observed in the *large intestine.* In the forming stage they appear in the shape of superficial, circular erosions, from one to two-thirds of a line in diameter, generally neither injected nor protuberant. In this stage they may easily escape observation under superficial examination. Each of these ulcerations will be found developed upon a follicle. When more advanced, the mucous membrane is seen to be riddled, not with superficial erosions, but with true ulcerations, of a perfectly circular shape, affecting the whole thickness of the membrane; their edges, either pale or injected, circumscribe a small, grayish, semitransparent corpuscle, of the size of the head of a pin, from which by pressure a drop of opaque, grayish mucus may be made to escape. In a still more advanced stage may be observed, sometimes in the last half of the intestine, but most frequently in the rectum only, deeper and larger ulcerations, which, when isolated, are perfectly circular, and measure from a line to a line and a half in diameter, but which, from the running together of two ulcerations, are sometimes irregular in shape, and of a larger size. The bottom of these ulcerations is formed of the submucous, and often of the muscular tissue; their edges are of a slate-gray color, thickened, and sometimes detached; their depth is occasionally covered with a pultaceous, apparently pseudo-membranous layer, of a grayish white color. That the large and deep ulcerations just described, even when most extensive, are originally seated in the muciparous crypts, is proved by the presence amongst them of other ulcerations of more recent date, and smaller size, which present in their centres a well-marked mucous follicle, and show clearly the origin of the larger and more advanced ulcerations.

The mucous membrane itself presents different appearances according to the date and degree of the ulcerations. When the superficial erosions alone are present, it sometimes retains its ordinary normal grayish tint, but, more generally, it is of a rose-gray color, dotted with little patches of a deeper red, produced by very fine arborizations; or, lastly, it presents a very minute red punctuation. Besides the injection, there are usually softening and thickening of the membrane. The redness, softening, and thickening, are all most considerable around the deep ulcerations above described.

Small Intestine.—The lesions of the follicles of the small intestine are generally much less considerable than those of the large. Simple morbid development of the isolated and agminated follicles are almost the only alterations that are found. The follicles, especially the agminated, often have the appearance of being ulcerated, but a careful examination will generally show that this is not the case. The appearance depends on the fact of the orifices of the glands being dilated, upon unequal tumefaction of the surrounding mucous membrane, and upon the presence in the plaque of small, irregular, grayish points, consisting of a pultaceous matter, which makes the plaque look more projecting than usual. If, however, the pultaceous layer be gently rubbed with a piece of linen, it can be easily detached, when the mucous membrane beneath is found red, softened, and thickened, but not ulcerated. The lining membrane of the small intestine seldom presents any important changes in follicular disease. It usually retains its natural color, consistence, and thickness. When, however, the crypts are much altered, it is generally red, softened, and thickened.

Softening of the mucous coat is very generally present to a greater or less degree in entero-colitis. Bouchut states that in young infants the last eight or ten inches of the ileum is the portion of the small intestine generally diseased. The softening is sometimes accompanied by inflammation and thickening. In two cases he found the mucous membrane white and opaque, with an entire destruction of its consistence from the pylorus to the ileo-cæcal valve. In the large intestine its consistence is considerably modified, so that it is generally impossible to obtain strips. He adds that this condition always coincided with vivid redness. Legendre says that the mucous membrane of the small intestine is not softened unless the alterations of the muciparous crypts are very marked and extensive. In the large intestine he found the mucous tissue slightly softened around ulcerations of recent origin and slight extent, while around those of greater depth, the softening existed in a much more advanced degree. MM. Rilliet and Barthez, whose observations were made in children over fifteen months old, describe both pale and gelatiniform softening as frequently occurring in the small intestine. They say that it generally occupies the whole extent of the mucous membrane from the duodenum to the ileo-cæcal valve, that it is rarely limited to the inferior, and still more rarely to the superior portion of the bowel. Both varieties are common also in the large intestine, and they more frequently affect the whole than only a part of that bowel, though they are sometimes limited to the cæcum, colon, or rectum.

Symptoms; Duration.—In infants the *acute* form of entero-colitis generally begins with restlessness and fretfulness. The mother observes that the child sleeps less than usual and for shorter periods, and that its sleep is uneasy and broken by sighing or moaning, or by occasional expressions of pain flitting across the face. It takes the breast less frequently, and is satisfied to nurse for a shorter time, showing thereby an evident diminution of appetite. At the same time it is apt to reject its milk in larger quantities than usual, and this is often observed to have a very acid smell. After these symptoms have lasted a few days, and sometimes without them, the peculiar symptoms of the disease, the diarrhœa and other abdominal symptoms, make their appearance, and are accompanied by febrile reaction in most cases.

In older children the acute form may come on suddenly, with diarrhœa, loss of appetite, thirst, sometimes vomiting, abdominal pain and fever, from the first; or, as happens very frequently, the case begins with slight diarrhœa, unaccompanied by fever, or other signs of sickness, and it is not until after several, or eight, ten, or even more days, that signs of inflammation make their appearance.

After the disease is established, the most important symptoms are the following. The *diarrhœa*, which is the most prominent and characteristic, presents various characters. In order to appreciate this symptom as its importance requires, the practitioner ought always to see the napkins of the child at least once, and often more frequently, in the day. It exists in almost all cases of entero-colitis, in the erythematous and follicular inflammations, and in the ulcerations and softening which accompany or succeed simple inflammation. It is seldom absent, and yet that it is so sometimes, is proved by the facts mentioned by MM. Rilliet and Barthez, who state that they have calculated, from their cases, that it is wanting in about one of every twelve cases of inflammation or softening of the intestine. They add, however, that it is absent only in slight attacks, and is always present when the disease is severe. It varies greatly as to the frequency, abundance, and character of the stools. It varies also in its mode of progress, so that it presents great differences as to all these points from day to day, and at different portions of the same day. We may remark in general, however, that in proportion to the severity of the inflammation, so is the diarrhœa violent and constant, and that it usually increases as the signs of inflammation become more and more marked. It is rare to have severe diarrhœa when the anatomical lesion is of slight extent, though this does sometimes happen. The *number* of the stools, as has been stated, is exceedingly variable. This depends in great measure upon the violence of the case; for, while in those which present the symptoms of an inflammation of small extent, the stools seldom amount to more than six or eight a day, in those in which the evidences of more extensive and severer inflammation are present, there will be fifteen, twenty, twenty-five, or even more per diem. The *consistence* of the stools may vary between that which characterizes them in a state of health, and that of the thinnest serous fluid. The *materials* of which they are composed consist chiefly of mucus, bile, serum, small portions of feculent matter, portions of undigested caseum or other food, and blood. M. Bouchut (*Loc. cit.* p. 219), describes those of very young children as presenting the following characters.

1. They are semifluid, homogeneous, greenish, and similar to cooked vegetables; neutral.

2. Semifluid, homogeneous and green; often acid.

3. Semifluid, heterogeneous, greenish, and mixed with yellowish fragments of ordinary fæces; neutral.

4. Semifluid, heterogeneous, greenish, and mixed with fragments of undigested caseum; acid.

5. Diffluent, greenish, heterogeneous, composed of a large quantity of water in which float yellowish and greenish or whitish particles; acid.

6. Diffluent, greenish, like the preceding, and mixed with gas of a mawkish and sometimes sourish smell.

7. Diffluent, completely serous.

8. Bloody stools are very rare at this age. We have met with them once only in a child affected with acute hepatitis.

Such are the appearances of the stools in children who have not completed the first dentition. After the epoch of the first dentition the disease becomes much more rare, and when it occurs, is generally of a milder character, so that the discharges differ less from their healthy characters. Under these circumstances, they are usually less frequent, not often exceeding six, eight, or ten in the day, and retaining generally their yellow color or becoming brownish; they are commonly of a semifluid consistence, and may be called bilious. When, on the contrary, more frequent, they become fluid, abundant, mixed with mucus, and are either of a light yellow or brownish, or more rarely, of a greenish color. In some cases there are, in addition to the substances mentioned, pus, which indicates suppuration of the lower portion of the intestine, and fragments of false membrane. Moreover, it is very common in older children to observe traces of blood in the stools, sometimes in considerable quantities. I may remark that I have several times met with stools containing blood in children within the year, but much less frequently than after that age. The presence of blood generally coincides with small and frequent stools, attended with much straining, and often severe pain, and almost always indicates follicular inflammation and ulceration of the large intestine.

The serous fluid alluded to sometimes constitutes the whole of the discharge, so that the napkins are merely wetted through, without any or but a very small quantity of solid matter being left upon them. This kind of stool is very frequent in the cholera infantum of this country. The *odor* of the stools is important. In the beginning, while the discharges still retain some of their natural characters as to color and consistence, it is often very offensive, but as the case goes on, and the greenish color predominates, it is either sour, or becomes very slight. In some violent cases, in which the discharge consists of a watery, dark-brown fluid, the odor is fetid.

After diarrhœa, the most important symptoms are those which concern the *form, size,* and *tension* of the *abdomen,* and the presence or absence of *pain* or tenderness on pressure. In infants the abdomen is more distended than usual; but, according to Bouchut, the tension depends on the muscular effort made by the child to resist the hand of the physician. He says that when it is carefully examined, while the attention of the child is attracted in some other direction, it is found to be soft and supple, and rarely painful to the touch. In older children it is, in many acute cases, but not in all, enlarged, sometimes tense and sonorous, and very generally painful to the touch. The seat of pain is variable, but generally it is in one of the iliac fossæ or at the umbilicus. It is seldom acute, though the child not unfrequently shrinks away and cries out, as though it were excessive, from fear of the examination. It is easy to distinguish when the pain is real and when apparent, by withdrawing the attention of the child, by some device, from the examination, in which case it will cease to notice the palpation; or by touching some other part of the body, when, if the crying and shrinking depend on fear or nervous excitation, they will be as violent as when the abdomen is touched. Pain to the touch is an important symptom, as it is very generally indicative of acute enteritis. *Gurgling* is rare, according to MM. Rilliet and Barthez, in ordinary entero-colitis, though very generally present in typhoid fever.

Vomiting is very common in young infants, and is generally repeated several times a day. In severe and rapid cases it is a very troublesome and alarming symptom. In older children it is much less common, and is never really violent, except in some of the most acute cases. In them it is confined to the first few days of the attack.

After the diarrhœa is fairly established, young infants are almost always either very irritable, peevish, and restless, or weak, languid, and subdued. Their slumber is short and disturbed, and generally they sleep much less in the twenty-four hours than when in health, unless under the influence of anodynes. Older children are generally somewhat restless and irritable, but much less so than infants. There is seldom any disorder of the intelligence, though in acute cases there is sometimes slight delirium or headache. *Fever* exists in all acute cases. It is seldom continuous in infants except for the first few days, after which it almost always assumes the remittent type. It is marked by increased frequency of the pulse, which rises to 120 and 140, or in bad cases much higher; by heat of skin, often intense during the exacerbations; by thirst and diminished appetite; and by dryness and heat of the mouth. In older children the pulse is not generally so high as in infants, and in many of the mild cases the fever is very slight or there is none at all. In acute cases, however, it is sometimes continuous and marked by rapid pulse and great heat of skin.

The *tongue* is generally normal, though sometimes red on the edges and tip in acute cases. It is seldom dry, except during the fever. The *appetite* is almost always lost, and the *thirst* generally increased, though to a less degree than in diseases of the stomach.

The *countenance* presents nothing peculiar, except that the features are, according to MM. Rilliet and Barthez, drawn down towards the inferior portion of the face. Emaciation always takes place as the disease progresses, and in very severe cases, occurs with the greatest rapidity, so that in a very few days the child will be reduced from an appearance of vigor and strength, to that of the greatest debility. As this occurs the flesh loses its firmness, the skin hangs in folds upon the trunk and limbs and is dull and dirty in its tint, the eyes become sunken and surrounded with bluish circles, and the whole appearance of the child is that of misery and exhaustion.

In infants it is very common to meet with erythema of the buttocks and thighs, produced by the contact of the acrid stools and urine with those parts. This symptom is said by Bouchut to exist in five-sixths of the cases. I feel quite sure that it does not exist in so large a proportion of those which occur in private practice, though I have met with it in numerous instances. When severe it is generally accompanied by papules, which ulcerate after a time and form superficial ulcerations upon the skin. These ulcerations sometimes run together and become of considerable size and depth. In the form of the disease met with in the children's hospitals in Paris, erythema and ulcerations of the heels and internal malleoli are also met with, and constitute a serious complication in the case. They are said to depend on want of cleanliness, and the rubbing together of the feet of the child, unprotected by covering. I have never met with them in private practice.

The *duration* of the disease is stated by the French writers to be generally about fifteen days, at the end of which time convalescence is usually established. It may be shorter or longer. According to my own experience it is entirely uncertain. Most of the cases that have come under my notice have been rather shorter. The disease subsides gradually. The number of stools diminishes; they become less abundant and more consistent, and return to their natural color and odor; the pain on pressure, and the enlargement and tension of the abdomen disappear; and as this occurs, the fever subsides, the appetite returns, the temper improves, and the child enters into full convalescence.

The *chronic form* of entero-colitis generally follows the acute, though it sometimes presents many characteristic features from the first. It differs from the acute form chiefly in the absence or the much slighter degree of fever and other constitutional symptoms in the early stage. The diarrhœa is less abundant and less frequent. At first the child retains its spirits and many of the signs of health. But gradually its strength fails, the temper becomes irritable, the complexion grows dark, sallow, and unhealthy, the skin becomes dry and harsh, and, in consequence of the emaciation which takes place progressively with the other symptoms, hangs in folds around the shrunken extremities, or is drawn tightly over the joints and other osseous protuberances. The tongue is generally moist and natural, though in some cases red and dry, whilst in others it, together with the lips, partakes of the pallor which pervades all parts of the body. The abdomen is usually distended and sonorous on percussion, and may be painful or not on pressure in different cases, or in the same case at different periods of the disease; its parietes sometimes offer no resistance to the touch, so that the intestinal convolutions may be readily felt by the hand, or even between the fingers; and in some cases I have seen them so thin and relaxed, though the abdomen was more prominent than natural, that the outlines of the intestines, and even the peristaltic movement were visible upon the exterior. The appetite generally persists in spite of the gravity of the disease, and is sometimes increased. The stools, as has been stated, are not so frequent as in the acute form, seldom numbering over six or ten in the day and night. They consist of the products of an imperfect digestion, and contain not unfrequently the alimentary substances in the state in which they were swallowed, mixed with mucus, serum, pus, and sometimes blood. Their consistence varies constantly, but they are usually semifluid. Their odor is seldom natural, and often extremely offensive.

The *course* of the disease is very irregular. Even in the worst and most prolonged cases intermissions or remissions occur, so that the child will often improve greatly for days or weeks, and then suddenly relapse into as bad a condition as ever. In favorable cases these remissions become more and more frequent, and the symptoms gradually improve, until at length the child is restored to health. In fatal cases death is occasioned by the utter deterioration of the general health which finally occurs, and the child perishes worn out by long illness, or, as more frequently happens, some complication arises which hurries on the fatal event. Thrush is a frequent complication of chronic entero-colitis, and doubtless often hastens the death by the impediment which it occasions to the nursing or feeding of the child. Vomiting has almost always occurred towards the close of the fatal cases that I have seen, especially in those in which extensive thrush was present.

The *duration* of this form is of course very uncertain. It may last for weeks or months. I have known it to last two and three months in several cases, and in two others it lasted with occasional intermissions, in one a year, and in the other eighteen months.

DIAGNOSIS.—The diagnosis of acute entero-colitis is not difficult. There is no disease with which it is likely to be confounded. The characteristic features of the malady are the diarrhœa and other abdominal symptoms, and the absence of signs of other disease. The secondary cases are distinguished by the occurrence of the usual symptoms of entero-colitis during the progress of the primary malady.

The chronic form is not likely to be mistaken for any other disorder, unless it be the diarrhœa which occurs in tubercular disease, from which it is to be distinguished by the presence in the latter of the signs of tuberculosis of other organs.

PROGNOSIS.—Acute entero-colitis is always a serious disease in infants. The prognosis will depend in great measure on the circumstances under which the affection has been developed. It is much more unfavorable in a child fed on artificial diet, either wholly or in part, than in one who is nursed at a fine breast of milk. It is more unfavorable also in weak and delicate than in robust and vigorous children, and in those of poor people, who live in crowded unhealthy portions of cities and towns, whose habitations are small, damp, and ill-ventilated, and whose food is coarse and insufficient or improper, than in those placed in more fortunate and more healthful hygienic conditions. It is a more dangerous disease in summer than in winter. In hospitals for children it is a very fatal disorder, owing to the bad hygienic conditions under which the inmates are placed. In children who have passed though the first dentition, the prognosis is, as a rule, favorable. The disease is seldom dangerous when it occurs as a primary affection, while, as a secondary affection, on the contrary, it is much more apt to be serious.

The unfavorable symptoms are: great frequency of the stools; collapse; violent vomiting or retching; and dangerous cerebral symptoms, as coma, rigidity of the limbs, paralysis or convulsions.

TREATMENT.—The *prophylactic treatment* of the disease is important. It includes attention to *diet*, *dress*, *exercise*, and *habitation*. It has already been stated that one of the most frequent causes of the malady is the attempt to bring up the child on artificial diet, and particularly on one of an improper kind. It is clear, therefore, that to avoid the disease it is necessary that the child should, if possible, be nursed. If this cannot be done, the diet ought to be wisely selected and regulated in all its details by the physician. The one most proper is evidently that which most closely resembles the natural aliment of the infant. In my hands that which has best succeeded is prepared of cow's milk mixed with a small quantity of cream, and with water in which a certain proportion of gelatine has been dissolved, in the manner described at page 267. A regimen consisting of farinaceous substances prepared with water alone, or milk and water alone, has not answered in my hands nearly so well as that preparation. It is particularly important that the food should not be made too thick, whatever its ingredients may be. For this reason thick gruels of all kinds, cracker food as it is called, bread and milk, or thick rice and milk, should be absolutely forbidden to children under eight or ten months or a year old. Though I have seen some few children thrive upon such diet, the great majority suffer from frequent attacks of indigestion and simple diarrhœa, or are seized with entero-colitis, and either die, or recover only after a change of diet.

The *dress* ought to be arranged according to the season. *Exercise* in the open air is of the utmost importance, so much so, indeed, that every effort should be made to insure a certain amount of it every day. This is, after diet, the most important point in the prophylactic treatment.

Diet in the attack.—After the disease has made its appearance, the diet should be very carefully regulated. This constitutes, in truth, the most important point in the treatment. If the child is nursing, it ought to be confined entirely to the breast, and should the nurse have a large quantity of milk, it must not be allowed to nurse very often, nor very long at a time. Should there be the least suspicion that the milk of the nurse is unhealthy, it ought to be examined with the microscope, and if found to contain colostrum granules, a new nurse must be provided. If the disease comes on shortly after weaning, and persists for several days in spite of careful diet and treatment, it is safest to restore the child to the breast. When this cannot be done, we must select that form of artificial diet which seems most suitable. The best is, in my opinion, the cow's milk prepared with the solution of gelatine in the manner already recommended, but made very weak for a few days. I have often found it necessary, under these circumstances, to add four and even more parts of water to the milk, instead of two or equal parts, as is the usual custom.

In older children the diet, for a few days, ought to consist of nothing but barley or arrow-root water; after which thin preparations of arrowroot, rice-flour, sago, tapioca, or wheat flour, made with milk, or milk and water, with small quantities of bread, or, if the child refuse such articles, panada, or very thin chicken or mutton water may be allowed. The quantity of food, whatever it be, ought to be much less than usual, and in very severe attacks must be just enough to sustain the strength of the child, and no more. This system of diet is to be persevered in until the disease is removed, unless the child refuses it absolutely, in which case, we may allow pure milk, small quantities of ice cream, a little bread and butter, and small portions of chicken or mutton, well cooked, and cut up very fine. The return to old habits as the child recovers, or after full convalescence is established, ought to be made carefully and gradually, as there is no disease in which relapses are so apt to occur from neglect of this precaution.

THERAPEUTICAL TREATMENT.—I have found a large number of the mild cases that have come under my notice, all of which occurred in private practice, to recover under very simple treatment. When the patient is an infant at the breast, before the period of dentition, the simple direction not to allow it to nurse as much as usual, the use of a warm bath morning and evening if the skin be heated and the child restless and fretful, the administration of a small dose of castor oil (half a teaspoonful to a teaspoonful), or of spiced syrup of rhubarb in the same quantity, with half a drop to a drop of laudanum, followed in one or two days, if the disorder continues, by some simple astringent remedy, generally suffices to effect a cure. When, on the contrary, the case depends on an unhealthy or insufficient milk, when the child subsists entirely on artificial food, and when the disease coincides with the process of dentition, the attack is kept up and aggravated by these causes, and it is more difficult to obtain a cure. In the former case the diet is, of course, of all importance. In the latter, the gums must be carefully examined, and if found to be swelled and inflamed, and the teeth near the surface, they should be freely incised. After these matters have been attended to, the kind of treatment will depend on the character of the general symptoms and the violence of the enteritic disorder. When the fever is violent, the discharges frequent, painful, and mixed with mucus or blood, and the abdomen tumid, tense, and painful to the touch, it is proper to make use of *depletion* in strong and hearty children. When, on the contrary, the patient is pale and delicate, it is better, it seems to me, to dispense with bloodletting in any form. In young infants only leeches need, as a general rule, be used. They should be applied over the seat of tenderness, generally one of the iliac fossæ, in such number as to take about an ounce of blood, or in very hearty, sanguine children, two ounces. Dr. Stokes (*Loc. cit.*) is of opinion that it is sometimes necessary to bleed, even in infants, as he has seen the disease resist detractions of blood by leeching, and yield immediately to venesection. When it is impossible to bleed from the arm, he proposes the application of a leech or two to the back of the hand or foot, and then to immerse the part in warm water, by which method he states that a considerable quantity of blood may be obtained. In such instances I have always been able to bleed the child from the saphena vein as it runs over the inner malleolus, and would much prefer this plan, because we can readily observe the amount of blood that flows, which cannot be done when the blood is allowed to flow into water. Dr. Stokes recommends a second application of leeches should the first fail to relieve the symptoms. In older children we may substitute venesection for leeching if we deem it better, taking from two to six ounces of blood, according to the age and strength of the patient. During the fever the use of *warm baths* at about 96° or 97° will be found of very great service. They should be employed once or twice, or even three times a day, if the heat of skin, frequency of the circulation, and restlessness, continue. It will often be found very beneficial to envelop the child in a warm blanket for half an hour after the bath, as this will sometimes produce fine perspiration.

The internal remedies during the early stage should consist of one or two laxative doses, guarded by small quantities of an opiate; or we may administer what is regarded with great favor by most physicians in this country, *calomel*. When the febrile symptoms are strongly marked, I believe that this is a very useful remedy in many instances. It is given differently by different practitioners. Some prefer one or two large doses, while others use it in minute quantities, and repeat it more frequently. It is clear to me that this ought to depend on the nature of the attack, and the age and constitution of the child. In delicate subjects, and those within the year, I always prefer to employ small doses, from a twelfth to a sixth of a grain, to be repeated every two hours until a grain has been taken, after which I administer a small quantity of castor oil or syrup of rhubarb. In stronger and older children, on the contrary, in whom the attack is violent, it is often more useful to give from half a grain to two grains in a single dose, and follow it by the laxative in a few hours.

The best mode of using the mercurial is to give the above small doses of calomel, with one or two grains of prepared chalk, every two or four hours; or to make use of the hydrargyrum cum cretâ, in doses of a quarter of a grain every two or four hours. Dover's powder, when there is no contraindicating condition, ought to be associated with the mercurial. From a sixth to half a grain of this preparation, according to the age of the patient, is the proper quantity.

Dr. J. Cheyne (*Loc. cit.*) recommends calomel very strongly in the treatment of the disease, which, as has been stated, he calls atrophia ablactatorum. He gave it in doses of half a grain morning and evening, continued for a week or ten days, or until the discharges assumed a more natural appearance. Dr. Stokes (*Loc. cit.*) states that the internal remedies from which he has obtained the most advantage, are a combination of a mild mercurial with Dover's powder, and gummy solutions. The mercurial which he employs is the hydrargyrum cum cretâ.

I am very much in the habit, in all cases of entero-colitis, of administering *opiates* in some form. Some writers object to their employment in the early stage as injurious. I have never been deterred from using them, however, except in cases presenting manifest signs of cerebral irritation in connection with the febrile symptoms. When there has been nothing more than irritability, restlessness, and insomnia, when there is evident pain during the discharges, and when the latter have been very frequent, I have always made use of such remedies without hesitation, and I am sure without injury, but on the contrary, with very great benefit. I am very glad to find that Dr. Stokes also employs opium without hesitation. He says "it is a remedy that requires caution in its exhibition, but one of great utility." It generally lessens the number of discharges, and very often diminishes the heat of skin and frequency of the circulation, by allaying the irritability of the nervous system, while at the same time it greatly promotes the comfort of the child. I have used it in the form of laudanum or paregoric, given in combination with a laxative early in the case, or by enema, and afterwards in that of the Dover's powder or powdered opium, mixed with calomel. For a child under six months old half a drop of laudanum is enough to give per orem. Of the Dover's powder about a sixth or eighth of a grain may be administered mixed with the same quantity of calomel, to be repeated every two or three hours until three or four doses have been taken, or until the child shows some degree of drowsiness from the action of the opium, after which it ought to be suspended for six or eight hours, and then resumed. If it be desirable to give the opiate by enema, about one or two drops may be administered in a teaspoonful of thin starch. In cases of older children, the doses must of course be larger. For those more than a year old, about two drops of laudanum may be given with castor oil or rhubarb; or a quarter of a grain of Dover's powder with the same quantity of calomel, or finally, from two to four drops of laudanum by enema. During the acute period of the disease, and particularly when the abdomen is distended and painful, warm mush poultices, made light and thin, placed between pieces of flannel, and applied over that region, will be found very useful and soothing remedies; they should be renewed every few hours.

Generally speaking the acute constitutional symptoms either subside or disappear under the above treatment, and very often the diarrhœa also ceases and the child recovers. When, however, the diarrhœa persists, it is necessary to resort to two other classes of remedies, upon which great reliance is placed in the treatment of the affection. These are *astringents* and *absorbents*, of which the most important are prepared chalk, powdered crab's eyes, acetate of lead, rhatany, kino, and catechu. The chalk may be used in the form of the officinal Mistura cretæ, a teaspoonful of which is given after each loose evacuation, or several times a day. When the case is severe, the efficacy of this remedy is much increased by the addition of tincture of krameria, in the proportion of a drachm to two or three ounces of the mixture, of some opiate preparation, or of ten or fifteen drops of the aromatic syrup of galls (to be described presently), to each teaspoonful. Chalk may be used also with great advantage, as stated above, in powder, combined with Dover's powder, and sometimes with calomel, or in the form of the Hydrargyrum cum cretâ, which latter is a favorite prescription of many physicians, in the dose of from a quarter of a grain to a grain three or four times a day.

The powdered *crab's eyes* will sometimes arrest cases in which prepared chalk fails to produce any effect. It is generally employed in mixture. The formula I employ is the following:

℞.—Ocul. cancror. pulv.,	ʒi.
Acaciæ, pulv.,	ʒii.
Sacch. alb.,	℈i.
Aquæ fontis, Aquæ cinnamom.,	āā ℥iss.—Misce.

A teaspoonful to be given four, five, or six times a day.

M. Bouchut recommends the following prescription of Hufeland's:

℞.—Ocul. cancror. pulv.,	gr. x.
Aquæ fœniculi, Syrup. rhei,	āā ℥ss.—Misce.

Give a teaspoonful every hour.

Acetate of lead has been highly extolled by many writers in the treatment of the diarrhœas of children. I have had but little experience in its use, and am therefore unable to offer an opinion in regard to the influence which it may exert. It may be given in doses of from a sixth to an eighth of a grain, alone, or combined with chalk or Dover's powder, every two hours. *Krameria*, *kino*, and *catechu* may be exhibited alone, in the form of infusion or solution, or they may be given in conjunction with the chalk mixture. I have frequently employed the tincture of krameria in the latter way, and believe it adds very much to the efficacy of the remedy. About one or two drachms may be added to two ounces of the mixture, and the usual dose given. I have used, with much advantage, either alone or with chalk or crab's eyes mixture, an aromatic syrup of *galls*, in the dose of from fifteen to forty drops three or four times a day, or, when the discharges are very frequent, every two or three hours. It is prepared according to the following formula:

℞.—Gallæ opt. pulv.,	℥ss.
Cinnamom. pulv.,	ʒij.
Zingib. pulv.,	ʒss.
Spts. vini gall. opt.,	Oss.—Misce.

Let the ingredients stand in a warm place for two hours, and then burn off the brandy, holding some lumps of sugar in the flames. Strain through blotting paper.

Dr. Eberle (*Loc. cit.* p. 221) highly recommends the root of the *geranium maculatum*. He says it makes an "agreeable and efficient astringent," and is less apt to derange the digestive organs, and occasion irritation of the mucous membrane of the bowels, than kino. He uses it in the form of a decoction made with milk, by boiling an ounce of the fresh root in a pint of milk until half is evaporated. The dose is from a teaspoonful to a tablespoonful four or five times a day, according to the age of the patient.

The *nitrate of silver* is highly recommended as a remedy of late years by several writers. It is given both internally and by enema. The modes of administration will be described in the remarks on the treatment of the chronic form of the disease.

Revulsives are often of much service in the treatment of this, as of almost all the diseases of childhood. When there is much restlessness and irritability, with heat of the head and trunk, and coolness of the extremities, it will be found that mustard pediluvia, or sinapisms to the extremities, often allay these symptoms, and greatly comfort the little patient. When the abdomen is tense and painful, and the discharges preceded or accompanied by movements or crying indicative of pain, the application of a poultice of mush and mustard from time to time, to be followed by a simple mush poultice, sometimes acts very usefully.

Tonics and *stimulants* are often necessary in weak and delicate children from an early period in the attack, and in those who are stronger, after the disease has lasted for some time, and the acute symptoms have ceased, and been followed by weakness and exhaustion. The best tonic is, probably, *sulphate of quinine* in doses of from a quarter of a grain to a grain three times a day, continued for one, two, or three weeks, if necessary. Old *brandy* has answered better in my hands as a stimulant, than wine, wine-whey, or any of the tinctures. It may be given to the youngest children in doses of from five to ten drops every two hours, or a teaspoonful may be added to a wineglassful of sweetened water, and a teaspoonful given whenever the child will take it. I have been obliged, in several cases, to continue the use of the brandy for three, four, and five weeks. At the time when we are obliged to resort to this class of remedies, it is almost always necessary also to pay attention to the improvement of the diet. The proportion of milk to water ought to be increased, if it has been small heretofore; and we should employ every means to induce the child to take a sufficient quantity without overloading the stomach. At this stage small quantities of animal broths are proper, or the child may be allowed to suck pieces of juicy meat, or to eat very finely minced meat of chicken or mutton. The diet is in fact a most important part of the treatment at this period. Dr. Stokes says of it that "many children are lost by the practitioner neglecting this point."

TREATMENT OF CHRONIC ENTERO-COLITIS.—The management of the hygiene of the patient is more important than any other part of the treatment, in this, as in nearly all the diseases of the digestive organs in children; for cases will often recover when the diet, drinks, and exercise are properly regulated, without the use of any drugs whatever, whereas, most assuredly, but a small proportion of them would terminate favorably under the best and wisest therapeutical medication, were the hygiene of the child neglected. The remarks that have been made as to the diet most proper in the acute form will apply here. If the child have been weaned only a few weeks before the time at which we are consulted, and the case is at all serious, it is better to advise the procuring of a wet-nurse. I have several times known cases of the disease which had resisted the most carefully managed artificial diet and therapeutical treatment, recover in a few days after the child had been restored to the breast. It is often, however, impossible to follow this course, from the refusal of the parents to obtain a nurse, or of the child to take the breast of a stranger, and we are obliged to rest content with artificial food. I believe that the kind of diet which suits the largest number of children is one of milk. During some four years past, I have found the gelatine food already described, to answer better than any that I have ever essayed. It ought to be made very light and thin. About a scruple of gelatine should be dissolved by boiling in half a pint of water. Towards the end of the boiling, a gill of cow's milk, and a teaspoonful of arrow-root made into a paste with cold water, are to be stirred into the solution, and from one to two tablespoonfuls of cream added just at the termination of the cooking. It is then to be sweetened moderately with white sugar, when it is ready for use. The whole preparation should occupy about fifteen minutes.

When cow's milk, mixed with water alone, or prepared in the manner just recommended, evidently disagrees, I have sometimes found cream with water alone, or better still, with the solution of gelatine in water, in the proportion of one part of cream to five or six of the latter, to suit very well. In other cases, very carefully prepared chicken or mutton water, given several times a day, or but once, according to the taste and fancy of the child, will answer better. It sometimes happens that the child will refuse everything that has been mentioned, and yet the prostration and emaciation are such as to make it essential to procure some aliment that it will consent to take. I have, under such circumstances, given small portions of bread and butter, or stale sponge cake, with weak brandy and water, if the child is old enough to swallow solid food. Sometimes it will eat small quantities of meat, and when this has been the case, I have not hesitated to allow a chicken bone, with a little meat attached to it, or a piece of ham, or better still, a portion of roast beef, or of the tender loin of beef-steak, to be held in the hand and sucked; or we may give the white meat of chicken cut up very fine, or torn into the finest shreds. Of the latter about a teaspoonful is sufficient for the first day, given with a little brandy and water. The quantity can be gradually increased afterwards. There is another article which I have sometimes given when children have been exhausted for want of food, and when they require constant change in order to be tempted to take it. This is the yelk of a *hard*-boiled egg, which has the advantage of being very nutritious if digested, and of not being injurious, should it happen to pass into the bowel in the crude state, as it falls into a state of fine powder, which is not irritating to that organ.

The quantity as well as quality of the food is of the utmost importance, and should be strictly regulated by the physician, and attended to by the mother or nurse. As a general rule the child may be allowed as much as it wants of proper food, since the appetite is almost always greatly diminished, and it is not likely, therefore, that too much will be taken. If, however, there is disposition to nausea or vomiting, or, if the appetite remain as good as usual, the quantity must be restricted. The difficulty in most cases is to get the patient to take enough, and not to prevent it from taking too much, for I have very often ascertained, upon careful inquiry, that the quantity was entirely too small to support the strength of the constitution. A hearty child, six months old, fed solely on artificial food, will generally take between a pint and a quart of fluid in the twenty-four hours, while at a year old, it will take usually fully a quart or more of fluid nourishment, besides eating small quantities of solid food. Now, I have frequently known children laboring under chronic entero-colitis, not to take more than one or two gills of food in the day, which is manifestly much too little. When this is the case, therefore, we should always endeavor to stimulate the appetite and digestion by means of tonics and stimulants, and by causing to be presented to the child such a variety of food as may entice it to take a larger quantity than before.

The *therapeutical treatment* of the chronic form consists principally in the administration of tonics, astringents, and absorbents. Of these the most important are the powdered chalk and crab's-eyes, and the different vegetable astringents, which have already been noticed in the remarks on the acute form. These are to be given in the manner there recommended, and it is therefore unnecessary to repeat what has already been said. In addition to these there are some remedies which are particularly adapted to the chronic form of the disease. Amongst them are *nitrate of silver.* Dr. Eberle (*Loc. cit.* p. 251) says he has found its internal administration to produce the happiest effect in a few instances. His prescription was a grain of the nitrate dissolved in an ounce and a half of gum arabic water, with the addition of twenty drops of laudanum. The dose was a teaspoonful three times a day. He adds that he has never "known the slightest inconvenience to result from the use of this article in chronic mucous inflammation of the bowels, when administered in a mucilaginous solution and in very small doses." It has been much used of late years in France. MM. Trousseau and Pidoux recommend its internal use in the chronic diarrhœas of children occurring during dentition, after bismuth, powdered crab's-eyes, and diet have failed to effect a cure. Their formula is as follows:

R.—Argent. nitrat.,	gr. ⅕.
Aquæ distillat.,	ʒvi.
Syrup. sarsap.,	ʒiiss.—Misce.

To be given in eight or ten doses.

At the same time they employ an enema composed of a grain of the nitrate in three ounces of distilled water. It is highly recommended also in these cases by Hirsch of Königsberg. His formula is as follows:

R.—Argent. nitrat. crystall.,	gr. ¼.
Aquæ distillat.,	℥ii.
Acaciæ pulv.,	℈ii.
Sacch. alb.,	ʒii.—Misce.

A teaspoonful of this mixture to be given every two hours, and an enema, consisting of a quarter of a grain of the salt, with mucilage and a little opium to be administered. (*Ranking's Abst.* No. vi, p. 61.) I have employed this remedy in the proportion of from half a grain to a grain in a gill of water, by injection, morning and evening, for several days, with very decided benefit, in three cases of diarrhœa following summer-complaint, in which the stools were frequent, mucous, sometimes streaked with blood, and accompanied by tenesmus. Another excellent remedy in the chronic diarrhœas of children, one from which I have sometimes obtained very satisfactory effects, is the syrup of the *nitrate of iron*. It is given in doses of from two to five drops three times a day, in sweetened water, at the age of one or two years. *Creasote* also has been recommended of late years, and is highly thought of by some practitioners. It may be given in doses of from a quarter to half a drop every three or four hours, at a year old. Trousseau and Pidoux recommend in this class of cases the *subnitrate of bismuth* in the dose of from two to nine grains in the twenty-four hours. It may be given in powder, or suspended in syrup or milk. Bouchut recommends enemata of from ten to twelve grains of extract of *rhatany*, or six to ten of *tannin*, in about five to seven ounces of some vehicle.

Drs. J. Cheyne, Eberle, Dewees, and Condie, all recommend calomel in the treatment of the chronic disease. I am of opinion that it is often useful when given in very minute doses (⅛ to 1/12 of a grain), in combination with Dover's powder, three or four times a day, for three or four days, after which I would rather depend on astringents combined with opiates, and upon the use of injections of nitrate of silver. I have in several cases derived considerable benefit from the use of Hope's camphor mixture, given in the dose of from five to fifteen drops three or four times a day in water.

Dr. Pollak, of St. Louis (*Trans. Amer. Med. Assoc.* vol. viii, p. 260), speaks in the highest terms of the efficacy of sulphuric acid in diarrhœa.

He thinks that he has succeeded in establishing beyond cavil or doubt, "the almost specific effect of sulphuric acid in all cases of diarrhœa. I say in all cases of diarrhœa, and in diarrhœa only, for I hold it is less reliable, and even frequently injurious, in dysentery." He says, speaking of adults, that "the majority of cases were cured in 24 or 48 hours; few required the use of it for four days, and only a very small number took it as long as eight days; they got nothing else and were cured." He also states he "could successfully prove, that in the much and justly dreaded summer-complaint of children, in cholera infantum, it is much preferable to the mercurial, chalk, astringent, and opium treatment; it is even more rapid, and more positive in its effects with children, than with adults."

The dose he gives to adults, is usually half a drachm of the aromatic sulphuric acid every four hours, and he remarks that from four to eight doses generally sufficed to effect a cure. His usual formula (for adults) is as follows:

℞.—Acid. sulph. arom.,	℥ss.
Tinct. cardamomi comp. (or sp. lavandulæ comp.), syrupi simp.,	āā ℥i.—M.

The dose is printed two *tablespoonfuls* every two hours, but this must be an error of the printer; two *teaspoonfuls* must be the dose intended. "If there be tormina, feeble pulse, general prostration, I added aq. camphoræ, ℥i, and gave it in shorter intervals." Dr. Pollak adds, that "the first dose is almost invariably ejected, probably from its suddenly astringing the stomach. I then ordered iced water to drink *ad libitum*, in order to soothe and distend mechanically the stomach; had the dose repeated immediately, and have never seen it returned afterwards." Dr. Pollak does not inform us of the doses he employs in the case of children. We may suppose, however, that for a child of two or three years old, half a teaspoonful of the above mixture, and for a younger child, a yet smaller quantity, would be quite enough.

I have never myself used sulphuric acid in such large doses as the above, but for some years past have been in the habit of employing it in the following mixture with excellent results. In cases of diarrhœa showing a disposition towards dysentery, as often occurs in entero-colitis, and especially when the stomach has been irritable, so as to bear other medicinal substances badly, I have found this combination very beneficial.

℞.—Acid. sulph. arom.,	gtt. xlviii.
Tinct. opii,	gtt. xii, vel xxiv.
Syrup. krameriæ,	℥ss.
Aq. fluvial.,	℥iiss.—M.

A teaspoonful every 2 hours.

The spirits of turpentine in small doses have been highly recommended in obstinate cases of inflammatory diarrhœa by some persons. I have no experience in regard to it.

It should never be forgotten in the treatment of chronic diarrhœa in children, that the most important point of all is the regulation of the diet and other hygienic conditions. I am fully convinced that I have seen several children saved from death by attention to these points, and by the persevering and careful employment of tonics and stimulants. It often happens, after the disease has lasted for some weeks or months, that the function of the stomach is almost wholly lost. The child either refuses food or takes so little that the quantity is evidently insufficient to carry on the vital processes, or the greater part of what is taken is rejected by vomiting, or lastly, much of it passes off through the bowels, and appears in the stools in an undigested state, forming what is called lientery. If this condition of things is allowed to continue, the emaciation and exhaustion make rapid progress, and the case must soon terminate fatally. Under these circumstances all the ingenuity and skill of the physician are required to find means to restore vigor to the digestive function, and to recall the appetite of the patient. If the stomach is frequently sick, it is best to abandon all remedies but those which are stimulating and strengthening, and especially to forbid all such as are in the smallest degree nauseous. I would indeed depend entirely on the use of repeated doses of the oldest and most delicate brandy that could be found, of which from one to two teaspoonfuls may be put into a wineglassful of cold water, and the whole given by teaspoonfuls in the twenty-four hours. At the same time, the food ought to be chosen with the greatest care, endeavoring always to please the fancy of the child as much as possible, and it should be given in *very small quantities* often repeated. While this is being done, an occasional dose of anodyne, just enough to tranquillize without stupefying, may be given. If the rectum will retain it, it is better to give it by enema. In some cases I have found the aromatic syrup of galls given with brandy, to be taken by the child without any difficulty or disgust.

Exercise and exposure to the air are all-important. In some very severe and tedious cases, change of residence or travelling has been known to effect a cure after all remedies and other means had failed. In one case, in this city, which had lasted with but short intervals for two years, I obtained a perfect cure by persuading the parents to send the child into an elevated part of the country in the month of May, where it was kept until July, after which it was removed to the seaside until the end of August. Nothing was done in the meantime except to regulate the diet most carefully, and to keep the child the greater part of the day in the open air.

ARTICLE III.

CHOLERA INFANTUM.

Definition; Synonymes; Frequency.—Cholera infantum can be defined only by an enumeration of its characteristic features. These are its occurrence in very young children, and in the summer months; the evidences in the early stage of violent irritation and hypersecretion of the gastro-intestinal mucous surface, and at a later period of inflammation, ulceration, softening, and thickening of the same surface, particularly that of the ileum and large intestine: its chief symptoms are vomiting and purging; fever, generally of a remittent type, varying often with collapse; rapid emaciation; and towards the close, various cerebral symptoms.

The common name of the disease is summer complaint. Though rare in Europe, in comparison with its frequency in this country, it is nevertheless described with sufficient accuracy to point out a clear identity of the two by Billard under the title of follicular enteritis, by Barrier under that of apyretic and febrile follicular diacrisis, the latter term being taken from Gendrin, by MM. Rilliet and Barthez, in their second edition, under that of choleriform gastro-intestinal catarrh, and by Copland under that of choleric fever of infants.

It is of all the diseases which prevail amongst children in this country, one of the most frequent and important. It appears from Dr. Emerson's tables (*Am. Journ. Med. Sciences*, vol. i, 1827), that from 1807 to 1827, a period of twenty years, there were 3576 deaths from cholera under five years of age. This is the largest number of deaths, from any one disease, given in the table. The next largest item of mortality is under the head of convulsions, of which it appears that 3192 died in the same period of life. During the five years from 1844 to 1848, inclusive, there occurred in this city, 18,599 deaths from all causes under fifteen years of age. Of this total, 1611 died of cholera infantum, which is the largest number of deaths from any one disease with the exception of convulsions. Of convulsions there died 1729. After cholera infantum the largest number of deaths was caused by marasmus (1060), dropsy of the brain (1041), pneumonia (772), and croup (756). Cholera infantum, therefore, causes nearly as many deaths as convulsions during the first fifteen years of life, and rather more than twice as many as pneumonia.

Causes.—The most influential *predisposing causes* are the heats of summer, the impure air and badly ventilated dwellings of cities, dentition, improper diet, early age, and hereditary influence.

Heat.—That the heats of summer constitute a powerful predisposing cause to the disease is proved by the evidence of almost all writers, and by the fact that the disease occurs in its most characteristic and peculiar form only during the warmest months of the year. Dr. Lindsly (*Am. Journ. Med. Sci.* vol. xxiv, 1839) gives a table showing the deaths from the disease in Washington City, in the five months of June, July, August; September, and October, of 1837 and 1838, from which it appears, that in the former year there were 4 deaths in June; 10 in July; 14 in August; 3 in September; and 2 in October: in the latter year there were 2 deaths in June; 15 in July; 22 in August; 14 in September; and 2 in October. I regret that the deaths per month from the disease are not given in the tables of Dr. Emerson, or in those of Dr. Condie. It is universally agreed, however, that the disease is most frequent and fatal in the months of July and August, that it is much less so in June and September, and that in May and October it is seldom met with. That it is not the heat of the season alone, however, is proved by the fact that the disease is less frequent and fatal in some of the southern cities of our continent than in New York and Philadelphia. It is proved also by the following table, the materials of which I obtained from the paper of Dr. Emerson (*Loc. cit.*)

Year.	Mean temperature of the three summer months for each year.	Total deaths from cholera in each year.
1815	. . . . 76° F.	 92
1819	. . . . 76	 246
1818	. . . . 74	 196
1811	. . . . 74	 224
1817	. . . . 74	 130
1813	. . . . 72	 173
1812	. . . . 70	 154
1814	. . . . 70	 125
1816	. . . . 70	 87

The table is imperfect because I have been obliged to take the whole number of deaths from cholera at all ages for each year, and compare them with the mean temperature of the three summer months of the same years. It is not, however, so imperfect as this would at first view make it appear, since the vast majority of the returns under the head of cholera in the table of Dr. Emerson, are in fact cases of cholera infantum. This is shown by the fact that of 3812 deaths from cholera in the twenty years from 1807 to 1827 (including the nine years in the above table), only 236 were of persons over five years of age, and of course all the rest (3576) were of children, and therefore, cases of cholera infantum.

The table shows that the number of deaths is not in proportion to the mean heat of the season, since in 1815, when the temperature averaged 76°, there were only 92 deaths, being only five more than in 1816, when the mean heat was but 70°.

It would seem that in order for heat to produce the disease to a great extent, it must be combined with the close, impure air of cities. The disease prevails most in the low, thickly inhabited, dirty, and badly ventilated streets and lanes of cities, the atmosphere of which is loaded with exhalations and effluvia; while in the country, at the distance of but a few miles from a city in which it prevails extensively, it is comparatively very rare, except in children removed from the city. The disease is only too common amongst all classes of the inhabitants of our large cities, in the hot summer months. Even the rich, with their large, thick-walled, stone or brick houses, with airy, well-proportioned rooms, and large windows so placed as to secure a good ventilation, nevertheless find themselves compelled to flee the city during the summer heats. But the poor and destitute,—those who occupy small dwellings, with thin brick or frame walls, with little cramped rooms having low ceilings, small windows, and too few of them, built in the crowded and narrow streets and alleys,—to them the disease is a scourge. In their dwellings the heat during many of our summer days is stifling, the air is close, dense, and exhausting. The marvel is, not that their children suffer disastrously from the disease, but that they survive its attacks at all.

Dentition.—I believe this to be a most powerful predisposing cause of the disease, and yet it would seem to be less influential than age, for the tables of Dr. Emerson show that it is about twice as fatal in the first year as in the second, though the process of dentition is certainly more active and continuous in the second than in the first year. I have rarely observed it before the beginning of the process of dentition, and it is certainly very rare after its completion.

Age, as has just been stated, exerts a strong influence in the production of the disease. In the tables of Dr. Emerson, the cases of cholera infantum and cholera morbus are included under the one head of cholera, but as all cases of the disease under five years of age are called cholera infantum, the want of the distinction does not make the statements less useful to us. From them it appears that there were 2122 deaths in the first year, 1186 in the second, and only 268 between the second and fifth. Between five and ten years, only 52 cases are noted, and these would of course be entitled cholera morbus. In the five years from 1844 to 1848, inclusive, of 1611 deaths from cholera infantum under 15 years of age, 969 occurred in the first year of life, 529 in the second, 103 between two and five years, and only 10 after that age.

Sex.—There are no large tables of reference, by which to ascertain the exact proportion in which the disease occurs in the opposite sexes. It would appear, however, from my own experience, to be much more common in males than females, since of 77 cases of which I have kept a record, 48 occurred in boys, and only 29 in girls.

Constitution.—The disease is most apt to occur in feeble, delicate children, and in those of nervous, irritable temperament.

Diet.—There can be no doubt that the deprivation of the breast and the use of artificial diet strongly predisposes to the disease. Indeed, weaning in the summer and the resort to artificial food often act as an exciting cause, the disease making its appearance not unfrequently very soon after the change has been made. M. Barrier states that the use of feculent substances, often ill cooked or sweetened with too much sugar as food, is one of the most frequent causes of the follicular diacrises of young children. This agrees exactly with the opinion of M. Valleix as to the most evident cause of the enteritis and thrush so fatal amongst the children of the Foundling's Hospital at Paris. He states it to be *improper alimentation*, and particularly one consisting of feculent materials. He adds that he has never known a child nourished exclusively at the breast during the early months to have the disease. (*Guide du Méd. Prat.* t. iv, p. 60.) The use of too indiscriminate a diet during the second year is another frequent cause of the disease. I have several times known it to follow the giving a child the smallest quantity of fruit. I am quite satisfied that indiscretions in diet are very frequently the exciting causes of the disease in children in this city. The recklessness of some parents in this country in regard to the diet of their children is, indeed, astounding. One of the worst cases that I saw during the summer of 1852, occurred in a child who was cutting the last molar teeth of the first set, and was occasioned by the eating, on Saturday, of a quantity of water-melon at dinner, and of several pears in the afternoon. That night the cholera began, and on the following day, in order to cure the diarrhœa, the father took the child into the fields and gave it as many blackberries, not over ripe, as it would eat. I have known attacks brought on by currants, by peaches, apples, cakes, and all such imprudences. For a more detailed account of the influence of diet in the production of diseases of the intestines in children, the reader is referred to the article on entero-colitis.

Hereditary predisposition.—My own observation leads me to believe that the disease is apt to occur in certain families. It would seem probable that this peculiarity must depend on the fact that the constitutions of some families are particularly disposed to disorders of the digestive apparatus. I am acquainted with one family in this city, in which eight out of ten children, suffered more or less from the disease. Again, of these children, four have grown up, married, and have children. Two of these families have each lost a child from the disease; in a third, the two children of the family have been exceedingly ill with it; while in the fourth, some of the children have been sick, though not to the same degree. Again, I have attended two children in a family, one not quite two years, and the other three months and a half old, who have both been very sick with the disease. The elder child was ill the summer before in the same way. The mother of these children was herself very ill with the disease on several occasions during her infancy, as was also her brother.

ANATOMICAL LESIONS; NATURE OF THE DISEASE.—The best accounts of the anatomical lesions observed after cholera infantum will be found in Stokes and Bell's Practice (2d edit. vol. i, p. 474–483); in Dr. William E. Horner's paper (*Am: Journ. Med. Sciences*, Feb. 1829); and particularly in Dr. E. Hallowell's article on Endemic Gastro-follicular Enteritis, in the same Journal for July, 1847.

The nature of the lesions depends on the severity of the case, and the stage at which the fatal event took place. When death occurs early, the only lesions found are unusual development of the mucous follicles or glandular apparatus of the stomach and bowels, implicating chiefly the isolated glands, and in a smaller number of cases the agminated glands or plaques of Peyer. In severer cases and those which have lasted longer, the lesions observed are more important, and consist in inflammation and softening of the mucous membrane, and ulceration of the follicles, sometimes to a great extent.

Having already described with considerable minuteness, in the article on entero-colitis, the morbid alterations of the follicular apparatus of the gastro-intestinal canal, I shall not repeat the description in the present place, but merely allude to the alterations by name, referring the reader for a more particular account to the former place. The description of the lesions of cholera infantum which follows, is derived from the analysis of seventeen autopsies of the disease, three of which were made by Professor Horner of this city, and fourteen by Dr. Hallowell (*Loc. cit.*)

Stomach.—The mucous membrane presented traces of inflammation in the form of arborizations or injection in 6 cases, while in 10 the color was noted as pale or natural. Softening to a greater or less extent was noted in 10 cases; in 4 the consistence was natural; in 3 it is not mentioned. The condition of the mucous crypts is given in 6: in one not apparent; in one scarcely visible; in one slightly developed; in 2 distinct, but not much developed; in one largely developed.

Small intestine.—Traces of inflammation of the mucous membrane were noted in 7 cases, confined generally either to the duodenum or ileum, and affecting only a small extent of the bowel; in 9 the membrane was noted as pale; and in one its appearance is not mentioned. Softening existed in 5 cases, slight in all; in 7 the consistence was natural, while in the remainder the consistence is not mentioned. The isolated crypts are noted as numerous and distinct in 2 cases, as slightly developed in 9, as distinct in the ileum and not in other parts in 2, and in the duodenum in one; in 3 their condition is not mentioned; in 2 only they were slightly ulcerated. The *agminated* glands are stated to have been natural in 6; they were more developed than usual, and generally reddened, in 6; in 5 their condition is not given; they were not ulcerated in any of the cases.

Large intestine.—The condition of the mucous membrane as to inflammation is not mentioned in 2 cases; in 9 it is stated to have been more or less inflamed throughout; in 2 the inflammation was confined to the rectum or the lower part of the colon; in 4 the inflammation was slight, and in 2 of these it existed only around the follicles. The consistence of the membrane is not mentioned in 6; it was found more or less softened in 9, thickened in one, and normal in one. The *muciparous crypts* are stated to have been developed, without any reference to the presence or absence of ulcerations in 3 cases; to have been developed with a few ulcerations in 8; much developed with many ulcerations in 7; and finally to have been developed and not ulcerated in 4. The character of the ulcerations is not mentioned in all the cases. In some it extended to the submucous tissue, and in a few to the muscular. The ulcerations of the crypts are generally most marked in the rectum.

The stomach often contains a good deal of mucus adhering to the lining membrane; the small intestines contain orange-colored mucus; while the large bowel generally contained mucus adhering to the inner coat, and a good deal of thin fæcal matter of a grayish color.

Dr. Hallowell (*Loc. cit.* p. 49) states that in patients who died during the second stage, that is, before the appearance of dangerous cerebral symptoms, the lungs presented nothing remarkable beyond a slight engorgement posteriorly, except in three cases in which the children had had measles or hooping-cough, and one in which pleurisy had followed exposure to the night air. "The peritoneum presented its usual healthy color in all the cases observed; the liver was greatly enlarged in but a single instance, contrary to the statements of most authors, who affirm this to be uniformly the case; the gall-bladder was more or less distended with dark-colored bile, staining the finger a deep yellow; the mesenteric glands were not enlarged; the spleen and kidneys presented nothing remarkable." In regard to the brain he states that in most of the cases the veins of the pia mater were more or less distended, and the membrane injected also, but that the injection was generally confined to the larger ramifications; the substance of the brain presented injection of the central portion in one, and of the central and cortical portions both in another; there was softening in four cases, and little or no effusion into the ventricles. In patients dying in the third stage, with stupor, convulsive movements, rigidity or paralysis, there were found, in addition to the morbid appearances already described, disorganization of the structure of the brain from softening of its tissue. The softening, sometimes general, was more frequently confined either to the cortical substance, or to the central portions of the brain and cerebellum. The softening may be such that the brain will readily give way on slight pressure, or its substance may be so diffluent as to resemble cream. The substance of the brain commonly presents numerous red spots from effusion of blood; the pia mater is more or less injected and its veins much distended;

and there is in some cases, but not in all, serous effusion into the subarachnoid tissue, and lateral ventricles.

NATURE OF THE DISEASE.—It was for a long time supposed that cholera infantum was peculiar to this country, and widely different from any malady reigning amongst children in Europe. Its real nature was very imperfectly understood until within a few years, when the researches of Dr. Horner showed that it resembled very closely the follicular enteritis described by Billard in his work on children. Dr. Hallowell, in his recent and valuable paper, which I have so often quoted, gives it the title of endemic gastro-follicular enteritis, and regards it as a disease chiefly of the follicular apparatus of the digestive canal. After careful study of some of the most important European works upon the diseases of children, after close comparison of these descriptions with those given by our own authors, and with my own observations, I am led to the conclusion that cholera infantum or summer-complaint is the same disease, with differences of frequency, severity, and fatality, with that described by Billard as follicular enteritis, by Barrier as follicular diacrisis, apyretic, febrile, and complicated, by MM. Rilliet and Barthez as choleriform gastro-intestinal catarrh, and by the authors of the *Bibliothèque du Médecin Praticien* under the title of "enteritis of children," including in that term inflammation, softening, diarrhœa, and diacrises. Let me state, however, that, while I believe cholera infantum to be the same disease in its real nature as those just mentioned, I also believe that it differs from them greatly as to frequency, severity, fatality, and in the circumstance of a larger portion of the gastro-intestinal mucous membrane being affected than is usual in the milder cases observed in Europe, in which smaller portions of that membrane are generally implicated.

From the description of the anatomical lesions already given, it appears that the most characteristic and constant morbid alterations are *development* and *ulceration* of the follicular apparatus of the stomach and bowels. The mucous crypts are stated to have been much developed in the stomach only in one instance, and slightly developed in three. They were not ulcerated in any. In the small intestine they were more frequently affected, having been found numerous and distinct in two cases; distinct in the ileum only in two, and in the duodenum only in one; and as slightly developed in nine. In two only were they slightly ulcerated. Of 14 cases, therefore, in which their condition in the small intestine is mentioned, they were much developed only in two, and ulcerated in the same number. In the remaining cases, the alterations were slight, or observed only over a small part of the bowel, generally in the ileum or duodenum. The agminated glands were natural in 6 cases, more developed than usual, and generally reddened in 6, and not ulcerated in any. Of 12 cases, therefore, in which their condition is described, they were developed in half, and natural in the remainder. In the large intestine the crypts are said to have been developed in all the 17 cases. In 10 of these they were ulcerated, in 4 not ulcerated, while in the remaining 3 their condition as to ulceration is not mentioned. To recapitulate: the follicles are noted as having been developed in the stomach in three cases, as ulcerated in none; in the small intestine they were numerously developed in two cases, more slightly so in twelve others, and slightly ulcerated in two; in the large intestine, they were developed in all, and of 14 in which their condition as to ulceration is mentioned, that lesion was noted in 10. It is clear, therefore, that the follicular disease is most constant and extensive in the large intestine, less so in the small bowel, and but seldom present in the stomach.

As to *inflammation* of the mucous membrane, we found that of 16 cases in which the state of the membrane was noted in the stomach, that lesion was present to greater or less extent, generally very slight, in 6, while in 10 the tissue was pale and natural; of 16 cases in which its condition is noted in the small intestines, it was found inflamed, usually in the duodenum or ileum only, in 7, while in 9 it was noted as pale; the condition of the mucous membrane of the large intestine as to inflammation is mentioned in 15 cases, in 9 of which it was more or less inflamed throughout, in 2 the inflammation was confined to the rectum, in 4 it was slight. Inflammation was observed much the most frequently and extensively therefore in the large intestine, only half as frequently in the small intestine, and to a much slighter extent, and in a rather smaller proportion of cases in the stomach.

Softening existed to a greater or less extent in the stomach in 10 out of 14 cases, in which the condition of the mucous membrane as to that lesion was noted; of 12 cases in which it was sought for in the small intestines, it was present in 5, in all slight, while the membrane was natural in the other 7; of 11 cases in which it was noted in the large intestine, it was present in 9, absent in 1, while thickening existed in the remaining case. Softening existed in the stomach and large intestine in about three-fourths of the cases, and in the small intestine in rather less than half.

As to the other abdominal organs, it was ascertained that the liver which has been thought by many authors to play so great a part in the pathology of the disease, was much enlarged only in one case; and that the mesenteric glands, spleen, and kidneys were healthy. The brain, on the contrary, generally presented some injection of the membranes, and in most of the cases which proved fatal in the third stage, there was extensive disorganization of its substance from softening.

For my own part, I am disposed to believe that cholera infantum is a disease of the mucous membrane of the alimentary canal, which, beginning with morbid development of the mucous follicles or crypts, independent of *evident* inflammation, occasions first supersecretions from those organs, and after a time runs into inflammation and its results, ulceration, softening, and thickening. That it is not an inflammation in the beginning is, it seems to me, clear from the nature of the anatomical lesions, and from the facts that the early stage is often unaccompanied by any febrile movement whatever, and is not unfrequently attended with disposition to collapse, like that which occurs in the cholera of the adult; but that it becomes an inflammation after the development of the follicular apparatus has lasted a short time, is also, I think, apparent, from the nature of the anatomical lesions, and from the circumstance that there is always a more or less violent febrile reaction after the first few days.

This part of my work will not be complete until I lay before the reader the results arrived at, and the opinions expressed by MM. Rilliet and Barthez, in the last edition of their valuable work. These opinions have been already, in part, placed before the reader in the previous articles on the diseases of the stomach and intestines. In the chapter on "choleriform gastro-intestinal catarrh" by those authors, will be found the following remarks on this particular form of disease (t. i, p. 775 *et seq.*). "The disease we have just described is, in our opinion, a catarrh which has localized itself upon the digestive tube and great sympathetic nerve. It is, of all forms of the catarrhal affection, that which most clearly justifies the idea of a poisoning. It proves also that anatomical differences alone, will not suffice to establish a separation between the various species of the disease.

"Its catarrhal nature is demonstrated by the causes, which are those of all catarrhs (improper alimentation, epidemic influence, &c.), by the analogy of the symptoms, by the gradual passage of the mild into the grave forms, through intermediate cases; and, lastly, by the fact that simple intestinal catarrh is often but the prodrome of choleriform enteritis.

"Reasoning from the simple fact that the disease is catarrhal, we admit the existence of a modification of the whole economy and of some alteration of the blood.

"Its localization upon the digestive tube is proved by the excess and vitiation of the gastro-intestinal secretions, and by the results of post-mortem examination. The catarrhal nature of the disease foreshows and explains the variety or absence of the anatomical lesions.

"We are of opinion, therefore, that the following conclusions are incontestable.

"I. The diseases described under the titles of *softening of the stomach*, of *choleriform enteritis*, of *cholera infantum*, of *cholerine*, of *acute inflammation of the plaques of Peyer*, &c., comprise a large proportion of the grave and acute, or highly acute gastro-intestinal diseases of early childhood.

"II. These diseases, described under different names, are really one and the same affection.

"III. This proposition is proved by the identity of the etiological, nosographical, and therapeutical characters of the disease; the anatomical features alone differ.

"IV. The different names imposed upon the same disease prove that pathological anatomy has failed to establish its unity. But the want of similarity between the results afforded by microscopic examination does not destroy the exactitude of proposition second.

"V. A study of the anatomico-pathological descriptions of the disease, and especially the observation of cases, demonstrate that the gastro-intestinal tube of children dying of this affection may be found in four different conditions:

"*a.* Either the stomach is softened without any lesion of the digestive tube;

"*b.* Or the stomach is softened, at the same time that the mucous membrane of the intestines, and especially its follicular apparatus, is diseased;

"*c.* Or the stomach is healthy, whilst the follicular apparatus or the mucous membrane are diseased;

"*d.* Or, lastly, the gastro-intestinal tube fails to exhibit any lesion appreciable by our senses in the present state of our knowledge, or it presents alterations too insignificant to explain the gravity of the symptoms.

"Up to this point, the disease resembles all other catarrhs; but what gives to it a special type, is the abundance of the serous secretions and the disturbance of the great sympathetic nerve.

"The serous secretion, which seems to be produced by perspiration (analogous to that of the respiratory passages and of the skin) rather than by a follicular secretion, shows, perhaps, that the elimination of morbid matter is accomplished by other organs than the follicles; and we ought, perhaps, in this to see a proof that the matters to be eliminated are not the same as in simple catarrh. On all these points we are compelled to remain in doubt: we content ourselves with stating the fact.

"The functional derangements of the tri-splanchnic nerve play an important part in the disease: under this point of view it differs from the mild form, in which the innervation is normal, and from the cerebral form, in which it is especially the cerebro-spinal apparatus that is sympathetically affected. The proof of a disturbance of the ganglionic nervous system rests upon the following physiological and nosological considerations.

"1. The disease exists at the age and in the physiological condition (dentition), in which functional derangements of the nervous system without lesions of organs, are most frequent; it is often complicated with those very disorders of the general innervation, as is proved by certain profound changes in the functions of nutrition, circulation, and calorification, which the amount of material deperdation will not always account for. We occasionally observe the same symptoms of nervous sideration, and particularly the extreme smallness of the pulse, and the algid phenomena, to arise in certain of the most violent attacks of spontaneous peritonitis. Now these phenomena, which cannot always be referred to the intensity of the pain, and which do not exist in inflammations of the other serous membranes no matter what the rapidity of their course, are only to be explained by the fact that the disease, seated in the abdomen, envelops the ganglions of the great sympathetic nerve."

The reader may suppose that the above quotation, copious as it is, ought to suffice to bring before him the opinions of the authors cited. But I cannot resist, however prolix it may seem, quoting a little further from their work to show how similar many of the symptoms of cholera infantum are to those developed under the influence of inanition. Any light that can be thrown upon the important and complex subject of the gastro-intestinal diseases of childhood, deserves to be spread as widely as possible before the medical body, and I shall not hesitate, therefore, to make the additional quotation. At page 778 will be found the following remarks: "In reading the remarkable memoirs which Dr. Chossat (of Geneva) has published upon *inanition*, we have been struck by the analogy that exists between the results of experimental inanition and the chief symptoms of choleriform enteritis; we shall cite in particular:

"1. The diminution of temperature which, conjoined with the loss of weight, is in inanition, as in cholera infantum, one of the principal causes of death;

"2. The stupor which follows the jactitation as the temperature falls; a symptom observed also in enteritis;

"3. The colliquative diarrhœa during the last few days of life, the severity of which is proportioned to the rapidity of the fatal termination, and to the increase of the algidity.

"When we recollect on the one hand that one of the effects of inanition is to vitiate the blood profoundly, and when we observe on the other hand the influence that certain toxic or medicinal agents have in depressing the animal heat, and their effect on the derangements of the great sympathetic nerve, we find in the relation we are seeking to establish between choleriform enteritis, inanition, and poisoning, an additional proof of that double influence of a change in the fluids and of the disorders of the nervous system which, in our opinion, plays so important a part in the production of this dangerous disease.

"In choleriform enteritis, therefore, the blood, the ganglionic nervous system, and the digestive organs, are in a morbid condition. We seek not to determine which of three portions of the organism is primarily affected; it suffices us to show that their alteration recognizes catarrh as its common cause.

"The perturbation of the ganglionic nervous system explains to us: the particular form of the catarrh, its rapidity, the sudden emaciation, the deep prostration, the depression of the temperature, the smallness of the pulse, perhaps the suspension of the biliary secretion even; and lastly, the analogy existing between some of the symptoms of this disease, certain cases of poisoning, the effects of inanition, and peritonitis."

SYMPTOMS.—The *invasion* of cholera infantum is extremely irregular in its mode of manifestation. It may be sudden or gradual. When sudden, the child is attacked with diarrhœa whilst apparently in good health, and either simultaneously, or within a few hours, with more or less violent vomiting. I have known a child put to bed early in the evening, seemingly well, to wake at ten o'clock and have twelve large, fetid, fluid evacuations before morning, and then pass through a regular attack of the disease, lasting ten days. Much more frequently, however, the invasion is gradual, and the disease begins with slight diarrhœa, which makes its appearance after the child has shown unusual fretfulness, irritability, restless sleep, and some loss of appetite for one or two days. Most authors agree that the disease generally begins with diarrhœa, which after a few days or even longer time, is associated with vomiting. Of 71 cases that I have seen in which the mode of invasion was noted, it began with diarrhœa, and was associated with vomiting, in from two to seven days after, in 21; in 21 the invasion was sudden, vomiting and purging coming on almost simultaneously; in 29 there was no vomiting, or the child merely rejected doses of medicine which disgusted it. In sudden and violent cases, the vomiting and purging are attended with the usual signs of exhaustion,—quick, small pulse; coolness or coldness, with paleness of the surface; altered countenance; extreme languor, and all the signs of severe illness.

In slight cases there is no fever at first, and the child, though more peevish and irritable than usual, can be amused and diverted at times. In severer attacks there is often a febrile reaction from the beginning, while in very violent cases, the earliest symptoms are those of collapse, soon followed generally by intense heat of the head and body, and very frequent, tense pulse, which subside after some hours, to give place to a more or less complete remission, or to a return of the state of collapse.

As the *diarrhœa* is the most important symptom of the disease, it is necessary to trace its characters with as much accuracy as possible. The first change in the appearance of the stools is that they become more frequent, abundant, and fluid, than natural. They retain their homogeneous appearance, but change from the dark orange color which they present in health, to a lighter yellow, like that of the yolk of egg, and begin to contain spots of a greenish color. As the case goes on, the green tint generally deepens, until the whole of the discharge is of that color, so that it looks like chopped spinach. This is usually the predominant color of the stools after the first few days. There is often mixed with the other materials constituting the discharge small whitish lumps, which consist of undigested portions of caseum. Sometimes they contain small quantities of fæcal matter also. Their *consistence* varies greatly, according to the stage, severity, and duration of the case. At first pasty and mush-like, they become after a time semifluid, with more consistent portions intermixed, the fluid parts running through the napkins and clothes of the child, and leaving merely yellowish and greenish, or whitish grumous particles upon the latter; while in other cases they are completely serous and leave no solid portions whatever upon the napkin. The *odor* is very characteristic in severe cases. It is excessively fetid, so as to render it almost impossible to cleanse the child from it, and making it often absolutely necessary to open the windows in order to get rid of it. I have known it so bad as to produce sickness of stomach in a delicate person. It is impossible to describe it except by saying that it is putrefactive in character. This peculiar odor almost always coincides with copious watery stools, of a dark-brown color. In milder cases the odor is somewhat fetid, but less so than in severe attacks, or it may be acid, or again the discharges may be entirely inodorous. The *quantity* varies greatly. In severe cases it is much more abundant than usual, and is sometimes very large indeed, particularly in the early part of the attack. At a later period the quantity is generally less, and sometimes amounts only to a slight stain upon the napkin. In some of the cases the stools assume a dysenteric character, containing mucus mixed with blood in greater or less proportion, in addition to the matters above described.

During the acute stage of the disease the child evidently suffers from *pain* in the bowels. This is shown by fretting, uneasiness, restlessness, and crying, for some time previous to a discharge, and by crying and sometimes violent screaming and tenesmic straining at the moment of the evacuation. This is particularly apt to be the case when the discharges contain blood or mucus, showing severe disease of the colon or rectum.

The *number* of stools in the twenty-four hours is very irregular. As a general rule, they will amount to from four or five to six or eight, though in severe cases they will run up to fifteen or twenty. I have rarely met with more than twenty or twenty-five as the highest number. In one fatal case, however, in a child between one and two years old, there were between 25 and 30 stools during the second night of the attack, in a space of twelve hours.

The substances *vomited* consist of the contents of the stomach mixed with mucous and bilious matters. The frequency and violence of the vomiting differ greatly, according to the severity of the case. Sometimes it is very distressing and frequent, so that everything is rejected as soon as taken, and with great violence; at other times there is frequent and painful retching and efforts to vomit, though there may be nothing upon the stomach; while in other instances again it occurs only two or three times a day. It seldom continues to a great extent more than two or three days, after which it ceases entirely, or recurs only at intervals, and particularly after the child has been allowed to take too much food or drink at one time.

The disease is almost always accompanied by a *febrile movement.* The period at which this occurs, and its degree, depend on the severity of the attack. In bad cases, attended with much diarrhœa and occasional vomiting, it is almost always considerable, and sometimes violent; whilst in those which are milder it seldom appears until some days after the invasion, and is slight. It is almost always of the remittent type, the exacerbations occurring in the afternoon and evening. In very mild cases there may be none, or it may consist merely of slight quickness of pulse, a little heat of skin, and unusual restlessness at night. The pulse in mild cases retains its regularity, and its volume and tension continue natural. In severe cases it is quickened from the first, and as the disease progresses becomes very frequent, rising to 130, 140, 150, or more, and is at the same time small, quick, and tense. It becomes feeble, rapid, and sometimes intermittent, in cases threatening a fatal termination. The skin is generally dry and warmer than natural at all times, and becomes hot during the exacerbation. The heat is not usually equal over the whole surface. In very slight attacks it often affects only the hands and feet, while in most of the cases the head and abdomen, particularly the latter, are the hottest parts, whilst the extremities, especially the inferior, are natural, or cool. In sudden and severe cases, the temperature of the whole surface often falls below the natural standard, and the extremities are so cold as to require artificial means to keep them warm. Under these circumstances the surface is always pale, and there is usually some moisture upon it; the pulse is quick and feeble, the expression languid and exhausted, and there is indeed every sign of collapse. It not unfrequently happens that the state of collapse alternates with more or less violent febrile exacerbations, in which the surface regains its color, the face becomes flushed, the skin hot, and the pulse fuller, stronger, and less frequent. The respiration varies according to the degree of the reaction. It rises to 40, 50, or 60. Dr. Hallowell states that when over 30, it is more or less interrupted.

The *countenance* is scarcely altered in slight cases or in the early stage of any but the more violent. As the disease increases it becomes anxious and distressed, and is flushed during the exacerbations, and pale in the remissions. In sudden and severe attacks it is exceedingly languid and subdued, pale, and contracted; in protracted cases the features become thin and shrunken, the eyes are inanimate and sunken, the skin hangs in folds about the face, and the lips are thin, dry, and have a rigid look. The *nervous system* reveals by various symptoms that it is more or less disturbed in its functions. At first the temper only is changed. The child becomes irritable, peevish, and cross, and cries or frets at the least contradiction or without cause. The sleep is restless and disturbed from the first, especially during the night. The child wakes frequently and almost always with crying; when asleep, its eyes are often but half closed, the brow is contracted and frowning; it turns and twists, and moans or cries out as though in pain or distress. Towards the termination of fatal cases, drowsiness or stupor are very apt to take the place of jactitation.

The *appetite* is diminished in mild, and entirely lost in severe cases, except in children at the breast, who sometimes nurse with avidity, probably from thirst. The *thirst* is generally intense, especially when the febrile reaction is considerable. In some few cases, however, it is not present. The *mouth* is usually warm, and the *tongue* moist at first, and coated with a whitish, yellowish, or brownish-yellow fur. Later in the disease the tip and edges become red, and in chronic cases the whole tongue often acquires a dry, red, smooth, or polished appearance. In those which tend to a fatal termination it often becomes dry and incrusted, and is sometimes covered with aphthæ.

The *abdomen* is rarely tumid or tender to the touch in the beginning, except when the disease is very severe, and the invasion sudden. At a more advanced stage it almost always becomes tympanitic and tense, and sometimes, though not always, when carefully examined, is found painful on pressure. It is evident in most cases of any severity, from the drawing up of the inferior extremities, the twisting and turning of the trunk, and the crying of the child, that the evacuations are attended with more or less pain.

Unless the attack be very slight and of short duration, there is always manifest *emaciation*. When the disease is grave the emaciation makes rapid progress in a very few days; and in slow, tedious cases, it is one of the most marked symptoms. The skin under these circumstances is dry and harsh; it assumes a wilted appearance, and hangs in folds about the neck, and especially over the internal surfaces of the thighs. The emaciation is sometimes excessive,—as great it seems to me, as in any other disease. About the time that the excessive emaciation described takes place, there frequently appears œdema of the feet, and sometimes a bloated condition of the face. Simultaneously with the emaciation and œdema, aphthæ may appear on the tongue, cheeks, gums, roof of the mouth and pharynx; the anus is excoriated by the acrid discharges, and petechiæ sometimes make their appearance upon the skin, especially the parts on which the patient rests. The fatal event is almost always preceded by symptoms indicating serious lesion of the nervous centres. These are drowsiness, passing into stupor and coma; chewing motion of the under jaw, or, as I have several times witnessed, a disposition to rigid contraction of that part; rolling of the head from side to side; and convulsions, either general or local, which are followed by rigidity or paralysis of some of the limbs, or by irregular automatic movements of different parts of the body.

The *duration* of cholera infantum is exceedingly uncertain. Dr. Eberle (*Dis. of Children*, p. 285) says it sometimes runs on to a fatal termination in five or six hours. The most rapidly fatal case that I have met with lasted three days and a half. It often continues for weeks or even months. It is not uncommon for a child to be seized with the disease in June, and continue more or less sick until the following October, or November, and in some few instances it continues to have diarrhœa, from functional derangement of the bowels, or entero-colitis, the greater part of the winter. The attack is very apt to last two or three weeks, or until some change in the weather occurs, or the residence of the child is changed.

DIAGNOSIS.—The diagnosis of cholera infantum requires no particular elucidation. The season at which it occurs, the age of the patient, the concomitance of vomiting and purging, the nature of the evacuations, and the course of the affection, render it easy of recognition. I have already stated that I supposed the disease to be at first a simple choleric irritation of the digestive tube, which rapidly passed into inflammation or entero-colitis, if the attack continued a few days. What gives to the disorder its peculiar features in this country, in the summer season, is, in all probability, the severe and long-continued heat of the weather.

PROGNOSIS.—It is evident from the remarks made upon the frequency of the disease, that cholera infantum is a very serious malady, for it was then stated to be, with the exception perhaps of convulsions, the most fatal of all the affections of childhood. The prognosis in any particular case, however, must be determined by a reference to several different circumstances, of which the most important are: the hygienic conditions in which the child is placed; the age of life and the period of dentition at which the disease occurs; the present state of health; and the existence or nonexistence of hereditary predisposition.

The children of parents who are placed in circumstances of life such as to secure the most favorable hygienic conditions; who can leave the city for the country, when such a change is deemed necessary; who reside in large well-ventilated houses in a good quarter of the city; and who can afford the time and money necessary to procure whatever is deemed desirable (not to say essential) for the patient, have, doubtless, a vastly better chance of recovery than those in opposite conditions. One of the most unfavorable circumstances for the child, is the fact of its having been weaned at a very early age, or fed on artificial diet from birth. This, I believe, increases the danger to a very great extent, and yet, even here, much may be done by a wise system of dietetic management, together with a removal to a proper atmosphere, or change from place to place.

Cases occurring in very young infants, or early in the process of dentition, are more unfavorable than under opposite circumstances, because of the greater mobility of the nervous system in early life, and of the longer continuance in action of the predisposing cause, dentition, which tends to keep up the disease. Children already in feeble and deteriorated health from any cause, are more likly to die than those who are strong and well. Lastly, those who belong to families in which the disease has frequently prevailed, and especially in which it has proved fatal to other children, are in greater danger than where the opposite obtains.

I have no statistics as to the proportional mortality, beyond the simple statement that of 77 well-marked cases under two years of age that I have observed in private practice, 5 were fatal.

The prognosis may be stated in general terms to be unfavorable in proportion to the frequency and violence of the vomiting; the number of the stools; the severity of the fever; and the more or less marked character of the collapse. When the discharges consist merely of serous fluid, and they are copious and frequent; when they consist of small quantities of deep green matter mixed with much mucus or with blood; when accompanied by straining; when they number from fifteen to twenty-five in the day; when they are very fetid; and when with these symptoms, the abdomen is tense and tympanitic, the countenance pinched, the expression languid, the extremities cool, the pulse rapid and small, and the child irritable and restless, or, on the other hand, very still and subdued, the prognosis is exceedingly bad. If, after the symptoms just enumerated, drowsiness or stupor, and then coma, convulsions, rigidity, or paralysis, make their appearance, there is scarcely a hope left.

The favorable symptoms in a case are: diminution of the fever; equal temperature of the whole surface; cessation of vomiting; decrease in the number of the stools, and a return to their natural color, consistence, and odor; quiet, tranquil sleep; return of appetite; and lastly, a restoration of the natural temper and gaiety of the child.

TREATMENT.—*Prophylactic Treatment.*—The danger to which teething children are exposed from residence in this city during the hot months of the year, is now so well understood, that most families who can afford it remove to the country during the warm season, and by this course very generally avoid the disease. It is undoubtedly the best plan that can be adopted, and very commonly succeeds. When this cannot be done, however, the prophylactic treatment consists in a most careful attention to diet, dress, and exposure to the open air. If possible the child should be kept at the breast until it has passed through its second summer, as there is but little danger from the disease after that period. If the weaning must take place prior to that age, it ought to be accomplished before the hot weather begins, as a change from the breast to artificial food during the warm season is very apt to bring on the disease. If the child is weaned, the diet must be strictly attended to. Up to the age of ten months or a year, the food should consist almost wholly of milk containing arrow-root, rice, oatmeal, or some farinaceous substance in small quantity. A little plain chicken or mutton-water, with rice boiled in it, or a piece of beef or chicken to suck, may be given occasionally, but all vegetables and fruits should be strictly forbidden. After the age of ten months, some light soup and small portions of mutton, chicken, or very tender beef, minced very fine, may be given every day in addition to the milk food, which must still form the major part of the child's nutriment. Fruit of all kinds, all vegetables except rice and potatoes, and the latter are doubtful, ought to be carefully avoided until after the hot season has passed entirely away, or until the child has its full set of teeth. I have found the food prepared with gelatine, in the manner described at page 267, to answer better than anything else, for a large number of children to whom I have prescribed it.

The dress ought to be arranged according to the heat of the day. It is the fashion in this city to keep young children clothed all summer in thick flannel jackets and petticoats, and woollen socks. This is certainly too much for the hot days which so frequently occur in July, August, and early in September, and is often, I believe, very injurious. A light gauze flannel shirt is the only woollen garment that need be worn during the warm season. On hot days a child should have only this, a muslin petticoat and frock, and the lightest possible socks, or none at all. If, as constantly happens in our climate, a cool day comes, there should be added to these a light flannel petticoat.

It is of the utmost importance that children should pass as large a portion of the day as possible in the open air. In the country this is easily managed, and parents almost always contrive to accomplish it; but in a city, many people seem to think it of less importance, or their servants are occupied with other things, and it is neglected. It is nevertheless a matter of the greatest consequence; the child ought to be kept in the air by the nurse a large portion of the day, either in the garden attached to the house, if there be one, at the front door, walking the streets, or, better still, making short excursions into the neighboring country, taking care, however, to avoid the intense heat of the sun during the middle of the day.

I believe that with constant and wise attention to these points, viz., diet, dress, exposure to the air, and exercise, much may be done towards preventing the disease even in families obliged to remain in the city during the summer.

Hygienic treatment.—As soon as a child residing in a city is attacked with cholera infantum during the hot season, it ought to be removed, if possible, to the country. If this cannot be done, arrangements should be made that will allow of its being carried into the air during the cooler parts of the day, either in the arms, in a carriage, or by making excursions into the neighboring country. If there be extreme exhaustion or frequent vomiting, driving is too fatiguing, and we must rest satisfied with carrying the child through the house, or into the garden on a pillow, making it a rule in the former case to have the windows open as much as possible, to secure a good ventilation. If the patient surmount the violence of the attack, but continues to suffer from diarrhœa, loss of appetite, and emaciation, and remedies fail, after a trial of some days, to have any effect, we ought to insist upon a removal to the country, pointing out to the parents the very great probability of a fatal event, if this step be not taken. I believe that the best air for children in this condition is that of the sea-side, or of a hill-country. I have frequently known the most surprising recoveries to take place after a removal to the sea-coast, and they often occur with wonderful rapidity. I may state, moreover, my belief that the sea-coast or an elevated region of country are by far the best places to which to take children to pass the summer, for the purpose of avoiding the disease. As a general rule, in my experience, severe cases of this affection have not begun either at the sea-side, or in a hill-country, though of course there are exceptions to this.

The diet must be strictly and attentively regulated day by day. If the child is still at the breast, it ought, if the nurse have enough, to be confined entirely to it. Nothing else should be given except plenty of cold water from time to time to slake thirst. If the child has been recently weaned, the wisest course to pursue is to procure a wet-nurse at once. When, on the contrary, it is fed wholly or in part upon artificial food, the regulation of the diet is decidedly the most important point in the treatment. The choice of food must depend in some measure upon previous habits. It may be stated, however, in general terms, that the food ought to consist at least in part of milk or cream, a wholly farinaceous diet, as I have so often said, being, as a rule, unsuitable and injurious to the digestive organs. The diet that I prefer is the gelatine food already described, made with a small proportion of milk; for, though an infant may be able to digest, when in good health, pure cow's milk, or milk weakened with a third or half water, it will often fail to do so when the digestive power of the stomach is diminished by disease. I would therefore recommend only a fourth, fifth, or even sixth part of milk, with a very small quantity of cream, to be added to the solution of gelatine. To this, arrow-root may be added, in the proportion of a teaspoonful to a pint of the fluid. If, as sometimes happens, the child cannot digest milk, we may try cream one part, to water four, five, or six parts; or we may allow a little chicken, or mutton water, in which a small quantity of rice has been boiled, and afterwards strained out; or rennet whey may be given, and when the child is very weak, wine-whey with the addition of arrow-root water. As the disease subsides, or when the appetite is very poor, the patient may be allowed, with advantage, a piece of ham, chicken, or under-done beef to suck. During the height of the attack it is important to regulate as well the quantity as the quality of the food. This ought to be much less than in health, even should there be a disposition to take as much, which is seldom the case. When vomiting is frequent, and especially when it is obstinate, I have often found it necessary and useful to restrict the quantity to a very small amount, for instance, a tablespoonful, or even a teaspoonful, to be given only every half hour or twenty minutes, until the sickness ceases, after which it may be gradually increased. In severe cases it is sometimes well to allow nothing but gum water, or barley or arrow-root water, given in the manner just mentioned, for one or two days, taking care always not to let the child become too much exhausted for want of nourishment.

Therapeutical Treatment.—It is evident, I think, from the character of the anatomical lesions, and from the nature of the disease, that most cases begin as a simple irritation of the secretory apparatus of the gastro-intestinal mucous membrane, independent of evident inflammation. If this view be correct, the treatment in the early stage should be simple and calculated to avoid any increase of the already existing irritation. When the symptoms are those of simple diarrhœa, in which the stools are merely a little more frequent, abundant, and fluid than natural; when there is little or no vomiting; and when the constitutional symptoms consist of slight heat of skin and restlessness at night, with some languor and unusual irritability, I have found that lancing the gums if they required it, careful regulation of the diet as to quality and quantity, the use of the tepid bath morning and evening, or sponging with tepid spirit and water, and the administration internally of half a teaspoonful or a teaspoonful of spiced syrup of rhubarb, with one or two drops of laudanum on the first day, to be followed by a similar dose, or the use of some astringent remedy on the second day, will often remove the disease without its becoming aggravated. When, however, the attack progresses, and vomiting, with signs of entero-colitis and fever, make their appearance, the case requires other treatment than that just mentioned.

Attention to the *state of the gums* is undoubtedly a most important point in the management of cholera infantum. It often happens that a child will have an attack of the disease whenever the gum over an advancing tooth becomes very much swelled and tense, which shows the intimate connection that exists in many cases between the process of dentition and the disease. The gums, therefore, must always be examined, and if found to be prominent over any of the teeth, and at the same time hard, shining, and hot, they should be freely incised. I am convinced that this operation is often of great service in relieving irritability and insomnia, and also in rendering the disease more tractable to remedies, by removing a very important predisposing cause.

Baths.—The use of the warm and tepid bath, and of sponging with water and spirit, are important and beneficial elements in the treatment. In slight attacks, the tepid bath, used twice a day, has proved of great service in my hands. When there is severe fever with excessive jactitation, the warm bath should be resorted to twice or three times a day; or we may employ the affusion bath with water at 98°, containing vinegar, in the manner to be recommended in the treatment of scarlatina. It is a good plan, if the skin is very dry and hot, to lift the child immediately from the bath into a blanket or a cotton sheet, which has been moderately warmed, when, by wrapping it up, we may often obtain a perspiration, followed by calm sleep. If the child be weak and exhausted by a tedious or violent attack, a warm bath to which half a pint or a pint of whiskey has been added, will be found a soothing and refreshing application. When the use of the bath alarms or annoys the child so much as to produce violent agitation, it is better to abandon it for a time, and substitute sponging with warm or tepid whiskey and water, two or three times a day. In cases of extreme exhaustion, also, sponging is to be preferred to baths.

Purgatives.—The careful employment of purgatives in the disease is recommended by many writers. The motives for their use are differently stated by different authorities: some prescribe them with the view of emptying the bowels of vicious secretions, or of accumulations, others to stimulate the liver to greater activity, and some, especially the French writers on diarrhœa, enteritis, and follicular diacrisis, to modify the mode of action of the secretory apparatus of the intestinal tube. M. Legendre (*Loc. cit.* p. 672) says: "We agree entirely, therefore, with M. Gendrin, who regards emetics and purgatives as the most efficacious remedies in the treatment of the intestinal diacrisis." MM. Rilliet and Barthez (2ème edit. t. i, p. 725), speak highly of the effects of evacuants in the gastro-intestinal diseases. They suppose them to exert a topical action, which expels the matters secreted in too great abundance, and which modifies the particular mode of secretory irritation, or the existing inflammation even. They are of opinion also that they ought to be looked upon as addressing themselves to the very nature of the morbid state, by promoting a more rapid and abundant secretion of the heterogeneous and diseased products contained in the blood, and which ought to be eliminated by the mucous follicles. They find a proof of this in the favorable influence that evacuants directed to the digestive tube exert upon broncho-pulmonary catarrh. "In this case," they remark, "the topical action is null; and yet the mucous secretions of the bronchia are facilitated and rendered more copious at the same time that those of the digestive tube are provoked. Do we not address ourselves to the very nature of the disease, independently of any topical influence, when we provoke these abundant, rapid, and free hypersecretions?"

For my own part I have generally employed cathartics with care at some period of the disease, but feel convinced that they are capable of doing great injury when very freely or incautiously used. I believe that the proper moment for their administration is at the beginning of the attack, when we have reason to suppose that the bowels may contain the products of an imperfect digestion, or an accumulation of vicious secretions, or, whenever, in the course of the disorder, the stools are observed to be partially consistent, dark-colored, and very offensive. I think that in the latter condition of things they are very useful, particularly when preceded by several minute doses of calomel repeated every hour or two. When, on the contrary, the stools are copious and watery, of a deep-green color, mixed with a great deal of mucus, and accompanied with tenesmus and crying, I believe they tend to aggravate the symptoms. The only purgatives I venture to employ are rhubarb, magnesia, castor oil, or calomel. Of these, I prefer, in the majority of cases, rhubarb, in the form of the spiced syrup; of this a teaspoonful, or if the dose is to be repeated the same day, half a teaspoonful, guarded with half a drop or a drop of laudanum, is a proper quantity. If it be desirable to give a more speedy and active laxative, castor oil is preferable. A teaspoonful of this is as much, I think, as ought to be given in a single dose, and very often half the quantity is fully enough. When there are signs of acidity of the digestive organs, magnesia is the best purgative. From a quarter to half a teaspoonful is enough for a dose. Calomel is highly recommended both as a purgative and alterative by many different authors. The dose varies between a quarter or half-grain, and two or three grains, repeated every two, three, or four hours, until an effect on the bowels becomes manifest. My own opinion is that these doses are too large for young children, except in acute inflammatory diseases, and that they are apt to aggravate the existing irritation of the digestive mucous membrane. Moreover, it seems to me that such doses of a remedy, acknowledged to be a powerful sedative, cannot be proper in a disease which frequently exhibits a tendency to exhaustion, and even to collapse. From personal experience, therefore, I have been led to believe it better not to use calomel in purgative doses as a general rule, but to exhibit it in very small quantities, and follow it by some laxative, as, for instance, syrup of rhubarb or castor oil. The manner in which I prescribe it is to give from a twelfth to a sixth of a grain, with a quarter or sixth of a grain of Dover's powder, every two hours, until half a grain or a grain has been taken, after which I prescribe a small quantity of rhubarb or castor oil, and repeat the same treatment the next day, or the day but one after, if necessary. Employed in this way, I have seen it of great service in correcting the discharges when they have been of a dark brown color and very offensive, and sometimes when green and mucous. Dewees (*Dis. of Children*, p. 421) says he has never found "temporizing remedies as the alkalies, the absorbents, or external irritants, of the smallest service, we, therefore, never employ them." As soon as the stomach is tranquillized, he resorts to minute doses of calomel, giving as the average quantity a quarter of a grain every hour, until the bowels are decidedly operated upon, which "may be known, by the stools being more copious, less frequent, and of a dark green color, with a tenacious slime of the same or nearly the same tint of color." After this the doses are given less frequently; once in two, three, or four hours. A larger dose of calomel, two or three grains, may sometimes be exhibited with advantage when the constitutional symptoms are violent, and particularly when there are signs of severe cerebral irritation early in the attack. I have seldom found it useful to continue the calomel, in whatever dose employed, more than two or three days.

I am well aware, that the small doses of calomel above recommended by myself, are looked upon by some critics as entirely too small. Indeed, some have accused me of timidity in proposing such doses. I can only say that the larger and more careful, and, may I hope, the wiser my observation has been in the last few years, the more thoroughly convinced am I that the larger doses, such as were formerly recommended and used by nearly all writers and practitioners, are not only unnecessarily large, but most seriously objectionable. The indiscriminate use of this remedy, in all cases of the gastro-intestinal diseases of childhood becomes with some, I believe, a mere routine habit. They never try what may be accomplished without it, and go on pushing the drug in constant doses, when the case, if trusted to simpler means or even left to the efforts of nature, would do much better than when these delicate organs are made the receptacle of doses that cannot but tend to keep up the nausea and anorexia, which form so important a part of the morbid phenomena.

Antiphlogistics.—Dewees remarks that if there is "much fever, with great gastric distress, we have found the most decided advantage from bleeding, or the application of leeches over the region of the stomach; or if there be much cerebral determination, we bleed from the arm, or draw blood from the temples by leeches." He recommends caution, however, in the use of depletion, and says he never employs it during the decline of the disease. Eberle says that when the abdomen is tumid, tense, and tender to the touch, and the pulse frequent, contracted, and quick, depletion ought to be resorted to either by venesection or by leeches to the epigastrium. He thinks this ought to be done promptly and efficiently when the above symptoms are present. Dr. Condie recommends leeches to the epigastrium when there is increased heat of skin, when the patient appears to suffer much pain, and when the abdomen is tumid and tender to the touch. Leeches to the epigastrium are recommended also by Dr. Wood (*Pract. of Med.* vol. i, p. 677), when there is much tenderness of the abdomen, and the patient is not much exhausted. The same author advises a resort to local and general depletion, carried as far as circumstances will permit, when symptoms of meningeal inflammation occur early in the disease. M. Bouchut (*Loc. cit.*) opposes the employment of antiphlogistics in entero-colitis, except in some rare cases attended with strong febrile reaction and turgescence of the general capillary system. The authors of the *Bibliothèque du Méd. Prat.* (t. v, p. 674), state that antiphlogistics are now almost entirely abandoned in the treatment of the enteritis and diacrises of children. Dr. Hallowell (*Loc. cit.*) speaks strongly of the importance of the antiphlogistic treatment, "instead of the purgative plan usually pursued and with such fatal results." He recommends venesection, or, when the state of the pulse contraindicates it, leeches or cups to the abdomen.

I have seldom made use of depletion in the treatment of the disease, having been deterred from it in severe cases by the disposition to exhaustion and collapse, and in mild cases, by the belief that it was unnecessary. The cerebral symptoms which occur in the early stage, and which seldom consist of more than great excitement, restlessness, and irritability, have usually subsided without difficulty under the use of the warm or tepid bath, revulsives, or mild laxative doses; whilst those which occur towards the close of the fatal cases, and for which I formerly employed leeching on several occasions, without any benefit whatever, are, I am now satisfied, much more likely to be aggravated than ameliorated by depletion of any kind. In fact, I now have no doubt that the cerebral symptoms which occur in the latter stages of cholera infantum are of the same nature exactly as those described by M. Barrier (*Loc. cit.* t. ii, p. 56–7), as occurring in the follicular diacrises, of which he says, after stating that they more or less simulate meningitis: "On the whole, we are of opinion, from our researches, that they rarely depend upon intracranial inflammation; that, under other circumstances, especially when a slow and chronic mucous fever has occasioned great general debility, the serous diathesis, or anasarca, they may be the result of serous effusion into the ventricles or cavity of the arachnoid, and that they then constitute true hydrocephalus, a malady in which inflammation plays but a minimum part in the production of the phenomena. The only condition in which hydrocephalic or phlegmasial irritation seems to us at all common, is that in which there exists difficult dentition capable of determining a true and active sanguine congestion towards the head, and this coincidence of difficult dentition with gastro-intestinal diacrises is not rare, as is well known. But the cases are still more numerous in which the encephalic symptoms are of a purely nervous nature, not to be attributed to inflammation or active dropsy, and leaving no traces in the nervous centres when these are examined after death." If this view of the nature of the cerebral symptoms attendant upon the gastro-intestinal affections of children be correct, it would lead us to the opinion that antiphlogistics can seldom be necessary in their treatment, and such, as I have already stated, is the conclusion at which I have arrived from experience. When, however, they are accompanied by hot and flushed skin, with strong and active pulse, it would no doubt be proper to direct the application of leeches to the temples or behind the ears, of cold to the head, a blister to the nucha, revulsives to the extremities, and to make use of laxatives.

Revulsives are recommended by Parrish, Dewees, and Eberle, when the temperature of the surface is unequal; for the relief of troublesome vomiting; and when there is decided determination of blood to the brain. Dewees and Eberle recommend the application of a blister over the epigastrium when there is troublesome vomiting, and upon the extremities when these are cold, and when the cerebral symptoms are threatening. Dewees remarks that they usually promote perspiration, and adds: "It is a fact not sufficiently known, that without vesication, in certain conditions of the skin, diaphoresis will not take place." Eberle recommends the application of a blister behind the ears or to the back of the neck in the treatment of the disease, and says he has been much more successful since the adoption of this plan, than previously. He was led to the employment of this method by the example of Dr. Parrish, who began it from observing that infants who have the eruption behind the ears, so common during dentition, generally enjoy "an exemption from those dangerous disorders incident to this critical period of life."

I have commonly resorted to revulsives under the circumstances above mentioned, and have almost always used mustard in the form of sinapisms, poultices, or foot-baths. When vomiting is very troublesome, a mustard plaster, or better still, a poultice made of two parts of Indian meal and one of mustard, applied over the abdomen for fifteen or thirty minutes, is a most excellent remedy. This may be repeated with great propriety in two hours, if necessary. A spice plaster, made of different kinds of aromatics, as powdered cloves, cinnamon, and capsicum, half an ounce each, with enough flour and wine to make a poultice, and applied hot over the epigastrium; or one made of cloves, nutmeg, ginger, and hot wine or water, and used in the same way, answers an excellent purpose under the circumstances referred to. When the extremities are cold, and the child weak and exhausted, the use of sinapisms, hot foot-baths, or frictions with dry mustard, have proved very useful in my hands. I have never employed blisters except in cases attended with threatening cerebral symptoms, and then I have usually directed a small one to be applied to the nucha, taking care not to leave it in place more than one and a half or two hours, lest it might produce sloughing. I have never, however, known them to prove of essential service, except in the early stages of the disease. When the cerebral symptoms come on late in the attack, and consist of convulsions, rigidity, or paralysis, I believe blisters rarely or never do any good.

Opiates.—Eberle, in speaking of opiates, says that the use of opium is, in general, highly improper in the early stage. With this I entirely agree, so long as there is present severe fever and cerebral irritation; but when the stools are frequent, the child very uneasy and restless, and the discharges accompanied with pain, and especially when there is but little fever, while a disposition to coolness of the skin and exhaustion are manifest, from the violent onset of the disease, I find that minute doses of opium, either in connection with a laxative, with calomel, or by enema, prove a very useful and powerful curative means. I almost always resort to opium under these circumstances, making use of laudanum or paregoric, if it be given with syrup of rhubarb or castor oil; of Dover's powder, if with calomel; or of laudanum, if by injection. The dose of the opiate ought to be carefully graduated to the age of the child and the severity of the attack, being guided as to the latter point by the degree of pain and restlessness. It ought to be such as to tranquillize, rather than produce deep or long-continued sleep.

After the febrile stage of the disease has passed away, and particularly when there are signs of subacute entero-colitis or dysentery, opium is, in my opinion, one of the most important remedies at our command. It may be used either per orem, or by injection, and should be administered twice or three times a day. From one to three drops of laudanum may be given by injection under the age of one year; or half a drop to two drops per orem, or from ten to twenty drops of paregoric in the same manner. A very excellent form of opiate to employ is the Dover's powder, alone or combined with chalk, or acetate of lead. Of this I generally give from a quarter to half a grain three or four times a day. M. Bouchut remarks (*Loc. cit.* p. 229) that opiates are very much depended upon by the Germans, and quotes Hufeland as asserting that opium is "of all remedies the one which promises the greatest certainty."

Astringents.—Both Dewees and Eberle oppose the use of this class of remedies in the early stage as injurious. After the symptoms of reaction have somewhat subsided, and the remedies proper in the early stages have been made use of, nearly all writers coincide in recommending astringents for the purpose of diminishing the action of the secretory apparatus of the bowel, and of controlling the inordinate peristaltic action which are the chief causes of the frequent discharges. M. Legendre, who, as we have already seen, prefers the employment of emetics and purgatives in the early stage of the follicular diacrisis, recommends, in cases in which these fail to give relief, the use of absorbents, astringents, and sedatives. M. Bouchut (*Loc. cit.*) also makes use of astringents and tonics in the treatment of the diarrhœas of young children. I am in the constant habit of resorting to them in acute and violent cases, so soon as I am convinced that the laxatives administered at the beginning have had some action upon the bowels, and after or without the use of calomel; whilst in subacute cases, in which diarrhœa is the most important symptom, and in most of the chronic cases, they, with diet and carefully regulated hygiene, form the basis of the treatment I have been in the habit of employing.

The most important of the astringents in general use are chalk, powdered crabs' eyes, nut-galls, kino, catechu, rhatany, and acetate of lead. The best are the chalk and crabs' eyes, in combination with the astringent tinctures or with opiates, and the aromatic syrup of galls. Their modes of preparation and doses are given under the head of entero-colitis, to which place the reader is referred. The following is a formula which I have often made use of with much benefit in restraining the frequency of the discharges:

℞.—Tinct. krameriæ,	ʒii.
Tinct. opii,	gtt. xii.
Syrup zingiberis,	℥i.
Aquæ fluvial.,	ʒxiv.—M.

A teaspoonful four, five, or six times a day.

Another very useful one is the following:

℞.—Tinct. krameriæ vel catechu,	ʒii.
Tinct. opii,	gtt. xii.
Mist. cretæ,	℥iss.
Aquæ fluvial.,	ʒx.—M.

A teaspoonful, from four to six or eight times a day.

The acetate of lead is recommended by Eberle, Chapman, and Condie. It may be given in doses of from a quarter of a grain to a grain every two or three hours. Dr. Condie recommends it in doses of a grain, in combination with calomel, chalk, and ipecacuanha, to be repeated every three hours. I have used the sugar of lead only in dysenteric cases, and am therefore unable to give an opinion as to its efficacy in cholera infantum. MM. Rilliet and Barthez (2ème édit. t. i, p. 779) speak highly of nitrate of silver when the vomiting and diarrhœa are severe, and state that they prefer it to calomel. They dissolve from a fifth to three-fifths of a grain in two ounces of distilled water, and give a teaspoonful every hour, continuing it so long as the dangerous symptoms persist. They are of opinion that it acts rather as a neurosthenic than as an astringent or topical agent, and find in this an additional proof that a nervous element has much to do with the disease. I, also, have used this remedy with benefit both internally and by enema. I have also made use of the subnitrate of bismuth, either alone, or with prepared chalk, and sometimes with Dover's powder, with decided advantage in some cases, while in others it has failed to do any good.

Tonics and Stimulants.—It is often necessary to resort to these remedies in violent and in chronic cases of cholera infantum. When, for instance, in a sudden and severe attack, the patient falls into the state of collapse, which so often accompanies the disease, the use of stimulants becomes absolutely necessary. The one I prefer before all others is fine old brandy. Of this a teaspoonful may be put into a wineglassful or half a tumblerful of water, and the child made to drink of it from time to time; or, from ten to twenty drops may be given every hour or two hours. If brandy cannot be obtained, or if it be not of a good quality, old rum may be substituted, or very fine wine, or wine-whey, either alone or mixed with arrow-root water. In chronic cases also, when the child is weak and languid, inattentive, and without appetite from long illness; when the stomach seems to have lost in great part its digestive power, so that the patient not only refuses food, but often rejects by vomiting, in an undigested state, what was taken hours before, stimulants and tonics will be found of the greatest service. In some such cases I have been obliged to use a certain quantity of brandy three or four times a day for several days or even weeks in succession. There need be no fear of resorting to these remedies in cases marked by the above symptoms. I have never known them to do harm, and believe them to be often indispensable. Of the tonics, the best is probably quinine, in the dose of a quarter or half a grain three or four times a day, suspended in syrup.

A very excellent stimulant is the aromatic spirits of hartshorn, which may be given in doses of five or six drops every two or three hours. Eberle recommends tincture of cinnamon, in doses of fifteen or twenty drops in some mucilaginous fluid, every four hours.

One of the most troublesome symptoms of the disease is vomiting, which is sometimes so obstinate and frequent as to be extremely exhausting. It is very important to relieve it on account of the prostration by which it is accompanied, and to enable us to administer the remedies proper for the diarrhœa. Dewees says that there is nothing so certain, or so prompt in allaying the sickness, "as an injection of a gill of warm water, in which is dissolved a large teaspoonful of common salt; this is for a child of a year old and upward, proportionably less for younger." He says it must be given no matter how frequent may be the discharges. I have never resorted to this plan, having always succeeded with other remedies which seemed less likely to irritate the bowel, and which, therefore, appeared to me preferable. I have generally found a hot mush poultice, a mustard poultice, or a warm spice plaster applied upon the abdomen, and the administration internally of iced brandy and water by teaspoonfuls, of lime water and milk, of lime water and cinnamon water, of minute doses of calomel, or of very small doses of some opiate, with the direction that the drinks and food shall be given only by the teaspoonful or tablespoonful for twelve hours, successful in arresting the vomiting, however violent it might be. During the last eight years I have found, on some occasions, that even the smallest doses of calomel appeared only to increase the irritation of the stomach. When the vomiting has been very severe and distressing, I have succeeded in arresting it by withdrawing all milk food, even the breast, from the patient, for a space of six or twelve hours, and allowing no other nourishment than one or two teaspoonfuls of thin chicken tea to be given once in the half hour; while I gave as a remedy a few doses of from six to ten drops of solution of morphia every hour, with a teaspoonful occasionally of iced water slightly acidulated with the aromatic sulphuric acid. When the patient has been much exhausted, a teaspoonful or two of weak brandy and water thoroughly iced, has been given alternately with the chicken tea. Eberle recommends, under these circumstances, the application of a blister over the epigastrium; while Dr. Condie speaks very highly of the following formula:

℞.—Aquæ puræ, ...	℥i.
Acetat. plumb., ...	gr. v.
Acid. acetat. impur., ...	♏v.
Sacch. alb. pur., ...	℥iii.—M.

A teaspoonful to be given every hour or two, until the vomiting is suspended.

ARTICLE IV.

DYSENTERY.

It seems to me unnecessary, after the long article on entero-colitis, to make more than a few remarks on dysentery, which almost always exists in children in combination with inflammation of the small intestine, constituting the disease already treated of under the title of entero-colitis.

Dysentery is characterized by frequent evacuations, attended with more or less severe pain and straining, and consisting of mucoso-sanguinolent or sanguineous substances.

The *causes* of dysentery are but little understood, beyond the mere facts that it occurs as an endemic in some regions of country, and as an epidemic over large districts. It is frequent, also, as a sporadic disease, and in this form seems to depend upon the same causes as those already cited as productive of entero-colitis. Like cholera infantum, it appears to be more common in boys than girls, since of 39 cases of which I have kept notes, in which the sex is mentioned, 27 occurred in boys, and only 12 in girls. It is most frequent in the second and third years of life. Of 38 cases in which the age was noted, one occurred in the first year of life, 15 in the second, 7 in the third, 3 in the fourth, 3 in the fifth, 1 in the sixth, 3 in the seventh, 3 in the eighth, and only 2 from the eighth to the end of the eleventh year. It may be either idiopathic or secondary. As a secondary affection it is most apt to follow measles and variola. I have often known dysenteric stools to occur in the course of cholera infantum, and in a considerable number of cases such as I have described under the title of entero-colitis.

The *anatomical lesions* are confined chiefly to the large intestine, and are the same as those described under the head of entero colitis, except that they are of a graver character. The mucous membrane is commonly found thickened, swelled, red, and softened; the submucous tissue sometimes presents ecchymosed points; the follicles are often diseased, their orifices being enlarged and ulcerated, as described under entero-colitis. In grave cases, particularly those occurring under an epidemic influence, there are usually more or less extensive ulcerations, which may implicate only the mucous, or extend to the muscular or even peritoneal coat. In such instances, pseudo-membranous exudations are often formed, sometimes in large quantity, and often covering the ulcerations. The intestine contains sanguinolent mucus, sometimes a brownish or greenish material, which is evidently the result of a gangrenous condition of the mucous membrane, pus, and lastly false membranes. In some rare cases, perforation has been known to take place.

SYMPTOMS.—The symptoms are much the same as those already described as existing in entero-colitis, excepting that the local symptoms are more severe, and the presence of blood in the stools constant. The disease often begins as a *diarrhœa*. The *stools* at first contain feculent materials, but after a time become very thin, small in quantity, and consist chiefly of mucus mixed with blood. The blood may be black and in considerable quantity, or of a dark rosy red color, or like the washings of flesh; it is mixed with greenish or yellowish substances, whitish mucus, fragments of false membrane, or purulent fluid. In young children there is evidently *pain*, from the restlessness, moving of the limbs, and crying about the time of the evacuations, while in those who are older, there is true *tenesmus*, like that observed in adults, and severe pain in the anus. The number of stools varies according to the severity of the case. There may be only four, eight, or ten in the day, or many more. I have quite frequently known as many as 30 and 40 to be voided in the twenty-four hours, and in fatal cases, the dejections sometimes number three or four in an hour, while between the discharges the child often suffers from most violent and painful tenesmus.

The *abdomen* is generally distended, tympanitic, warmer than natural, and painful.

In mild cases there is usually no *fever*, or very little, while in severe attacks, there is high fever during the first few days, marked by frequent pulse, hot dry skin, followed after a time, unless a favorable change takes place, by coolness of the surface, contraction of the countenance, hollow, sunken expression of the eye, rapid emaciation, and death.

It is useless to give a longer detail of the symptoms, as they are the same as those already described in the article on entero-colitis.

The *diagnosis* presents no difficulties. The frequency of the discharges, the pain in the course of the colon and in the anus, the tenesmus, the character of the evacuations, and the febrile reaction, all make the disease easy of recognition.

The *prognosis* is favorable in mild cases, unattended with much fever, or very frequent discharges. When, on the contrary, there is violent fever in the beginning, followed by disposition to coolness and collapse; when the stools are exceedingly frequent, and attended with severe pain and almost constant straining; and when they consist of nothing but mucus, mixed with considerable quantities of blood, or with pus or false membranes, the prognosis is very unfavorable. Of 36 cases, the termination of which I have recorded, 4 proved fatal.

TREATMENT.—The treatment of dysentery in children is often very unsatisfactory. The mere variety of the remedies recommended by different writers and practitioners marks the uncertainty of the effects obtained from drugs. Mild cases so generally get well under any treatment that all methods have had their supporters and advocates, while grave cases, and especially those occurring under the influence of severe epidemic visitations, are so difficult of treatment, and often so little under the evident control of medical means, as to leave the careful observer in great doubt as to what he ought to set down as the evident result of his own interference in the case, and what as the result of the efforts of nature to cure the disease.

Mild cases of the disease, in which the fever is not very high, the number of stools not great, and the pain and distress moderate, require little else than *rest* in bed, a light and unirritating *diet*, and the use of *opium* in small quantities either internally or by injection. When there is reason to suspect the presence of unwholesome food in the stomach, or of unhealthy secretions in the intestines, it is necessary to give in the beginning small doses of some mild *cathartic*. The one generally preferred is castor oil, which may be given either simple, in the dose of a small teaspoonful containing one or four drops of laudanum according to the age, or in the form of emulsion. The latter is the mode of employing it usually chosen. A drachm of oil should be rubbed up with a scruple of gum, a little sugar, from two to eight drops of laudanum according to the age of the child, and seven drachms of some aromatic water. The dose is a teaspoonful every three or four hours. If the case continue to improve under the emulsion, it may be continued for a couple of days, but should the stools become more and more frequent, and the pain and tenesmus increase, it must be suspended after one or two days, and laudanum enemata, with or without the internal use of absorbents and astringents, substituted. The injections ought to consist of four or five drops of laudanum at two years of age, and of ten drops at five or six years, suspended in from half an ounce to an ounce of some mucilage, or thin farinaceous fluid, or simply mixed in a tablespoonful of tepid water, which is perhaps the best plan of all. The injections may be given every four or six hours if necessary, or they may be made use of only at night, while small doses of Dover's powders are administered every three or four hours through the day.

The *diet* in these cases should consist of arrow-root, sago, tapioca, or some such food, made into thin pap with milk and water; and the quantity allowed ought to be very moderate. Rest in bed, in the cradle, or in the lap, is very important. The child ought not to be allowed to run about, or use exertion of any kind.

Where the pain is severe and the fever high, and where there is a good deal of soreness in the abdomen, *depletion* may with propriety be resorted to, but always with moderation and prudence. A few leeches applied around the margin of the anus, or to the surface of the abdomen, often prove of great service in relieving pain and tenesmus. An occasional *warm bath* is very soothing and useful.

In very severe cases of dysentery the treatment is, as above stated, difficult and uncertain, owing to the dangerous character of the disease, and to the fact that so many different methods have been recommended by different writers.

In the early stage of a severe case, whilst the febrile reaction is high and the strength of the patient still unsubdued, depletion by leeches in young children and by venesection in older ones, is strongly approved of by many able practitioners. For my own part I have not resorted to it as a general rule, from the fact that I have so often found the strength of the child to fail rapidly under the disease itself. In a few of my cases, however, leeching around the anus has been followed by manifest benefit. The remedies most commonly depended upon are castor oil, in emulsion with laudanum, mercury, sugar of lead, opium, nitrate of silver, spirits of turpentine, and astringents. The castor oil emulsion, prepared as mentioned above, is useful in the early part of the attack, but ceases to be so, according to my experience, after the first twenty-four or forty-eight hours. From mercury I have not myself obtained any very positive benefit, though, in combination with opium and ipecacuanha in small doses, it is much thought of by many excellent authorities. The only remedy which is used by all, though it is rarely given alone, is opium, and the very fact that it is so universally employed points it out as one of the most reliable and valuable means we have at our command. It is certainly the one upon which I most depend myself. It may be given either alone or in connection with other substances. Where injections can be retained it is best given in that way. About five drops of laudanum at two years of age, or ten drops at four or five years, may be given in a tablespoonful of any bland vehicle every four hours. When the rectum rejects the enema as soon as administered, the opium should be given per orem, in the form of laudanum or solution of morphia, or in that of Dover's powder. Opium is almost always employed in connection with some other remedy, and particularly with calomel or acetate of lead. The dose of calomel is from a sixth to half a grain, or, as used by some practitioners, a grain, with a twelfth of a grain of opium, or half a grain or a grain of Dover's powder, every three or four hours, for children two or three years of age. The acetate of lead is more relied upon and has probably higher testimony in its favor than calomel. I have myself obtained excellent effects from it in some instances. The dose is from half a grain to a grain every two or three hours at two and three years of age.

There are two other remedies not yet mentioned, which have been of more positive efficacy in my own practice than any others, with the exception of opium. These are the nitrate of silver and the solution of the nitrate of iron. The former I have used both internally and by injection, the latter only by injection. For an account of the mode in which nitrate of silver is employed by different authorities, the reader is referred to the remarks on chronic entero-colitis. I have employed this remedy in 14 cases of dysentery. These were all severe attacks, and some of them most violent. Of the 14 cases, three died. The remedy was given by the mouth alone in 7 cases, by injection alone in 5, and by the mouth and by injection both in 2. It has proved most beneficial in its effects, in my hands, when given by the mouth, though its influence over the disease has always been less immediate than when used by injection, but they have been more permanent. The dose in which I have used it has varied with the age of the child, and with the severity of the symptoms. For children two years old I have usually employed from a quarter to half a grain, and for those of five or six years or upwards, a grain, dissolved in two ounces of a vehicle consisting of an ounce each of syrup of gum arabic and distilled water. The dose is a teaspoonful every two or three hours. It is well, as a general rule, to add from four to sixteen drops of laudanum, according to the age of the subject, to the mixture. For use by injection I have commonly employed for each enema half a grain for young children, and two grains for older ones, dissolved in four ounces of distilled water. On a few occasions I have made use of two grains dissolved in two ounces for each injection. The injections are to be repeated twice or three times a day. After the nitrate of silver enema has come away, it is a good plan to throw into the bowel a laudanum and starch injection.

I have made use of the solution of nitrate of iron, to which allusion was made above, only as an injection in acute dysentery. I have employed it in eight cases, and am quite sure that it was of essential service in six, while in two it appeared to irritate, probably because the quantity given was too large. My mode of applying it is to mix from ten to twelve drops in four ounces of tepid water for each injection. The injections were given twice or three times a day, and they were followed, as soon as they had returned, by a laudanum injection. On two occasions, the nitrate of iron injection has remained in the bowel for several hours before being rejected, and has thus restrained for that time the stools, which had previously been very frequent, and attended with much tenesmus.

When the stools continue very frequent in spite of the use of opium in some of its many shapes, when sugar of lead and nitrate of silver have been employed without controlling the frequency of the discharges, I have sometimes found the mixture of aromatic sulphuric acid, laudanum, and syrup of rhatany, recommended at page 346, very beneficial. When the stools, in addition to their dysenteric characters, have been watery, and greenish in color, the chalk mixture, with laudanum and tincture of rhatany, kino, or catechu, repeated every two hours, with occasional laudanum enemata, has been very useful.

The *hygienic management* of dysentery should be precisely the same as that which was suggested as proper for entero-colitis.

CLASS III.

DISEASES OF THE NERVOUS SYSTEM.

GENERAL REMARKS.

It is a very common opinion, both in and out of the medical profession, that this class of diseases occasions a much larger number of deaths in childhood than any other. Indeed, many persons suppose that, be the primary disease what it may, nearly all children who die, die as it is said by the brain. It appears, however, from an examination of the bills of mortality for this city, that this opinion is not well founded. During the five years from 1844 to 1848 inclusive, the number of deaths from diseases of the nervous system was less than from diseases of the digestive system, and though larger than those from diseases of the respiratory organs, not so much so as the popular notion would seem to warrant. The number of deaths from diseases of the nervous system was 3970; from diseases of the digestive system, 4204; and from affections of the respiratory system, 3376. M. Barrier, whose observations were made at the Children's Hospital in Paris, says (*Loc. cit.* t. i, p. 35) that, setting aside cases in which the nervous symptoms were probably only sympathetic of some other coincident disease, the cerebro-spinal affections were few in number in comparison with those of the thorax, abdomen, and senses, including amongst the latter the eruptive fevers. He states (*Loc. cit.* p. 34) that affections of the thorax constituted two-fifths of all the cases of disease, those of the abdomen and senses each one-fifth, and of the nervous centres only a tenth. M. Barrier, after combating the opinion so generally entertained, that disorders of the nervous system cause the death of the greater part of the subjects who die before puberty, says (*Loc. cit.* t. ii, p. 233) that there is only one circumstance that in part justifies this opinion, which he opposes "not as false, but as exaggerated," and this is, that the affections alluded to are almost always of a dangerous character, that they are beyond the resources of art, and that they furnish a very considerable relative mortality. He says that, according to his experience, the mortality in diseases of the cerebro-spinal system has been as sixty-eight in a hundred, whilst in those of the thorax, senses (including the skin), and abdomen, it was respectively as forty-eight, forty, and thirty-two in a hundred.

Before beginning the consideration of the particular diseases of this class, I am desirous of stating that I shall be compelled, on account of my limited space, to devote attention chiefly to those which are most important from their frequency or severity, avoiding or merely alluding to those which are of less consequence.

I shall divide the whole subject into two classes, the first of which will contain all the diseases attended with, and dependent upon, some appreciable alteration of the nervous centres, while the second will contain those in which no such alteration exists. Amongst those belonging to the former division, I shall treat of tubercular meningitis first as the most important, then of simple meningitis, of cerebral congestion and hemorrhage, and lastly of acute hydrocephalus, by which I mean serous effusions in the brain independent of tubercular disease. Encephalitis or cerebritis, and induration and softening of the brain, are of such rare occurrence in children as distinct and essential affections, that it is not necessary to treat of them separately. Amongst the diseases belonging to the second class I shall treat of several different convulsive affections, to wit, general convulsions or eclampsia, laryngismus stridulus or spasm of the glottis, idiopathic contraction with rigidity, and lastly of chorea.

CHAPTER I.

DISEASES OF THE NERVOUS SYSTEM ATTENDED WITH APPRECIABLE ANATOMICAL ALTERATIONS.

ARTICLE I.

TUBERCULAR MENINGITIS.

DEFINITION; SYMPTOMS; FREQUENCY.—This disease is characterized by violent cerebral symptoms, dependent upon the existence of tubercular granulations in the pia mater, as the essential anatomical lesion; and in the great majority of cases, by coincident inflammation of that membrane, by softening of the central parts of the brain, by effusions of serum into the ventricles, and in many instances by tubercular deposits in other organs. Until within a few years tubercular meningitis, simple acute meningitis independent of tuberculization, and simple dropsical effusion within the cavity of the cranium independent of inflammation, have been confounded together under the single term of hydrocephalus or water on the brain. It has been shown, however, by more recent researches, that a large majority of the cases of acute hydrocephalus of authors are, in fact, cases of tubercular meningitis. I am well aware that several of the English writers have not adopted this view of the pathology of these diseases, but nevertheless, it appears to me, that the observations of MM. Guersent, Gerhard and Rufz, Barrier, Rilliet and Barthez, Bouchut, and several others, have sufficiently proved that such is the fact.

The term hydrocephalus ought to be, and indeed is at present by many, restricted to the disease whose essential condition is the existence of serum in some part of the brain independently of acute inflammation. It is scarcely necessary to state that the popular term "water on the brain," is applied to almost every acute case in children in which dangerous or fatal cerebral symptoms are present.

There can be no doubt that this disease is one of rather frequent occurrence, though I am acquainted with no statistics excepting those given by M. Barrier (*Loc. cit.* t. i, p. 34, 36), which will enable us to form anything like an accurate idea upon this point. That author states that during the period in which his observations were carried on at the Children's Hospital in Paris, there occurred 576 medical cases of all kinds. In this number there were only ten cases of tubercular meningitis, whilst there were 83 of pneumonia, 48 of pleurisy, 24 of typhoid fever, 48 of measles, &c. &c., showing the first-named disease to be much less frequent than many other affections. We may also form some idea of its frequency in proportion to other diseases, by a reference to the work of MM. Rilliet and Barthez (1ère édit.), who report 33 cases of tubercular meningitis, against somewhat over 245 of pneumonia, 174 of bronchitis, 111 of typhoid fever, 167 of measles, and 87 of scarlet fever. I am of opinion that it is not of frequent occurrence amongst the easier classes of this city, since I have met with only twenty-three cases in private practice in the course of fifteen years. From what I have been told by other practitioners, however, it seems probable that it is much more common amongst the destitute classes, and particularly the blacks, who crowd the southern parts of the city, and who suffer to a great extent from tubercular and scrofulous diseases. It is impossible to obtain accurate information in regard to the frequency of the disease in this city, in comparison with other affections of the brain, from a reference to the bills of mortality, because of the fact that all or nearly all these affections are returned under the single title of dropsy of the brain. It may be stated, however, that during the five years from 1844 to 1848, inclusive, there occurred in this city 1041 deaths from hydrocephalus or dropsy under fifteen years of age, whilst during the same years there were 850 deaths from pneumonia, and 616 from bronchitis. Some of the cases returned under the title of dropsy of the brain were no doubt pure hydrocephalus, acute or chronic, others simple meningitis, and others no doubt different diseases in which cerebral symptoms occurred at the fatal termination; but a large number must have been instances of tubercular meningitis.

PREDISPOSING CAUSES.—MM. Rilliet and Barthez (2ème édit. t. iii, p. 511) state that the disease is very rare in the first year of life; that it becomes notably more frequent in the second year, but that it is between two and seven years of age that it occurs with the greatest frequency. After this it diminishes, they say, rapidly from eight to ten, and especially from eleven to fifteen years of age. The influence of *sex* has not been determined, but it appears probable that boys are somewhat more subject to it than girls. It has been clearly shown by the observation of various writers that the disease usually attacks delicate children, and especially those born of parents who are either themselves laboring under tuberculosis, or in whose families that diathesis has existed to a greater or less extent. Of the 28 cases that have come under my own observation, in 16 one of the parents either had phthisis at the time, or died of it subsequently; in 8 no trace of tuberculosis could be found in the parents or in their families, and in 4 the history of the parents and of their families could not be traced out. It is not uncommon for several children in a family to die of tubercular meningitis. Under these circumstances, it has nearly always been ascertained that the parents, or some of the immediate relations, have either died of tuberculous or scrofulous disease, or shown unequivocal signs of that diathesis. It may follow other diseases, and has been observed particularly after measles and other fevers, and after the suppression of eruptions.

M. Barrier (*Loc. cit.* t. ii, p. 379) explains, and I think with good show of reason, the causes of the disposition on the part of the tubercular diathesis in children to localise itself in the brain, as well as the disproportionate violence and extent of the inflammatory action in proportion to the degree of the tubercular lesion, by the physiological conditions of the nervous system in early life, which are those of great functional energy, and nutritive activity.

As to the *exciting causes*, nothing positive is known. The disease has been supposed to be brought into action by falls and blows upon the head, by violent moral emotions, and by exposure to the sun. These causes, however, are all of doubtful influence.

ANATOMICAL LESIONS.—The tubercles, which constitute the essential anatomical element of the disease, are very rarely found in the cavity of the arachnoid membrane, but almost invariably beneath that tissue, or in the pia mater. They generally exist either as yellow granulations or as miliary tubercles; gray granulations are rare. These may exist separately or together in the same individual. The isolated yellow granulations constitute the most frequent form of tubercle found in the meninges. They may commonly be seen through the arachnoid, scattered about in the shape of small, yellow, flattened bodies, from two to four-fifths of a line in diameter, scarcely resisting under the finger. When the pia mater is torn off from the surface of the brain, other granulations, which had been buried in the anfractuosities, come into view. These are rounded in shape, differing from those lying on the surface of the convolutions, which, as we have seen, are flattened from the pressure of the arachnoid. The size of the granulations varies very much. They are sometimes so small, and so closely resemble in color the surrounding parts, that it requires a careful search to detect them. They vary greatly also in number, existing sometimes in the greatest quantity throughout the pia mater, whilst in other cases it is difficult to find more than one or two on each hemisphere. They are found on all parts of the surface of the brain, on the convex and internal surfaces of the hemispheres, on the lateral and middle portions of the base, in the fissures of Sylvius, and on the cerebellum. They are more numerous, according to Rilliet and Barthez, on the convex surface of the hemispheres, than at the base, but this is contrary to what has been asserted by most other authors, who assert positively they are more frequently met with on the cerebellum than upon the hemispheres. Wherever found, they may be either isolated at some distance from each other, or collected together into groups of greater or less extent.

Miliary tubercles, which are not unfrequently met with, vary much in size, number, and arrangement. They vary in size from that of a hempseed to that of a pigeon's egg. Generally there are one, two, or three, about as large as a pea or small nut; if more numerous, there are seldom over fifteen or twenty, when they are usually about the size of a hempseed. Generally isolated, they are sometimes united into irregular masses, containing portions of altered pia mater. They are more frequent on the convex surface than at the base of the hemispheres, and on the left than right hemisphere. They are rarely found in the fissures of Sylvius, or on the cerebellum. As the tubercle enlarges it becomes strongly united to the membranes, and these latter, owing to the presence of the tumor, become attached to the dura mater. Internally, the tubercle forms a depression in the substance of the brain, into which it sinks deeper and deeper, until it is almost surrounded, preserving, however, its connection with the pia mater.

I shall next consider the lesions which coexist with tubercles of the meninges. The most important of these are inflammation of the membranes, and serous effusion into the ventricles. The chief seat of inflammation, as of the tubercular deposition, is the pia mater; the arachnoid membrane being, as a general rule, affected only to a slight extent. That membrane sometimes, however, contains a very small quantity of clear or turbid serum in its cavity. Its surface is often dry and viscid, and in some instances its whole tissue is opaque and thickened. But it is chiefly in the pia mater that are found the evidences of severe inflammation. In order to detect these changes, it is necessary to examine the membrane not merely upon the surface of the brain, but to tear it off, so as to bring into view the portions which dip in between the convolutions, and which often exhibit the greatest amount of morbid alteration. The inflammatory lesions vary between mere vascular injection, infiltration with clear, turbid, or gelatinous liquid, and the most abundant suppuration. When the inflammation has gone beyond mere sanguine injection, it is marked by infiltration of the membrane with turbid, whitish, or sanguinolent serum, with pus, which may be liquid or concrete, or with whitish coagulated lymph. These products are most abundant at the base of the brain, about the peduncles of the cerebrum, and in the fissures of Sylvius; on the convexity of the hemispheres they are more abundant on a line with the anfractuosities than on the summits of the convolutions. In this respect the disease differs from simple meningitis, in which the results of inflammation are usually as abundant and well-marked upon the convexity as at the base. MM. Rilliet and Barthez (2ème édit. t. iii, p. 404) state that, contrary to the tubercular deposit, the meningeal inflammation is incomparably more frequent at the base than on the summit of the brain, and that, while it is unusual to find it only upon the hemispheres, it is found rather frequently at the base only. At page 466, they say that in tubercular meningitis the seat of preference of the inflammation is the base, and that when found upon the convex surface of the hemispheres it usually surrounds the tubercles. In simple meningitis they have usually found it upon the convex surface and at the base at the same time, sometimes upon the convexity, but never at the base alone. The pia mater, which in a healthy brain can be readily detached from the surface of that organ, becomes, in cases of meningitis, particularly those which are violent, more or less adherent, so that in tearing it off, portions of the cerebral substance come with it. The proper tissue of the membrane is thickened and indurated, the degree of thickening depending on the amount of infiltration.

After the changes in the pia mater, the most important anatomical feature is effusion within the ventricles. This was formerly thought to be the essential lesion of the disease, but recent researches have shown that it is absent in some instances which have followed in all respects the ordinary course of the malady. According to M. Barrier, effusion cannot be supposed to exist unless the ventricles contain from one and a half to two ounces of fluid, whilst Rilliet and Barthez assert that the normal quantity is a few grammes (about a drachm). The quantity is very variable; sometimes there are only a few drops or a teaspoonful, while in other instances it amounts to three ounces and a half, or much more. It may be so large as greatly to distend the ventricles, rupture the soft commissure of the thalami, and even the septum lucidum, diminish considerably the thickness of the hemispheres, and flatten the convolutions against each other. In such cases the effused fluid passes through the membrane of the ventricle and infiltrates into and softens the substance of the brain, so that the latter becomes almost of the consistence of thick cream. The characters of the fluid vary in different cases. It is white, perfectly limpid and transparent, or it may be turbid, either from being secreted in that condition, or from holding in suspension albuminous or purulent flocculi, or portions of the broken-down walls of the cavity. In some rare instances it is sero-sanguinolent. Rilliet and Barthez remark that the effusion which coincides with tubercular meningitis is different from that which accompanies tubercles of the brain. In the former it takes place rapidly, is turbid, exists in smaller quantity, and constitutes acute hydrocephalus. In the latter it is secreted slowly and in considerable quantity, dilates the walls of the cranium, and constitutes chronic hydrocephalus.

The brain itself presents various morbid alterations. The whole organ often seems enlarged, so that the dura mater appears distended, and when the latter is cut into, the cerebral substance protrudes in the form of a hernia. At the same time the convolutions are observed to be pressed against each other, and the anfractuosities seem to have disappeared. The compression of the brain depends either upon the distending action of the ventricular effusion, or upon sanguine turgescence of the organ. In most cases, but not in all, there is evident congestion of the cerebral substance, shown by a more or less abundant dotted redness, and sometimes by a general rosy tint of the medullary, and vivid redness of the cortical portion. Softening of the substance of the brain is of common occurrence in connection with the other lesions. I have already spoken of the softening of the walls of the ventricles when there is much effusion, and which appears to result from the macerating influence of the fluid. I have also referred, very cursorily, to the softening which exists under the inflamed portions of the membranes, and which occasions adhesion of the pia mater to the brain beneath. In the latter cases the softening may be either red or white, and does not penetrate more than a line, and often less, in depth.

In addition to the changes already described, it is quite common to meet with tubercles of the brain itself, having no connection with the meninges. These are found in various parts of the organ, and differ greatly in size, varying generally between that of a millet-seed and hazelnut, but reaching sometimes the volume of a pigeon or hen's egg, or even that of half the fist.

I have a few words to say in regard to the lesions of other organs. It is undoubtedly true that in the vast majority of cases tubercles are found in other parts of the body. Of all the cases of tubercular disease observed by Rilliet and Barthez, amounting to 312, in only one was the deposit confined to the meninges. (*Loc. cit.* 1ère édit. t. iii, note, page

49). M. Valleix (*Guide du Méd. Prat.* t. ix, p. 196, 197) states, that in all the cases, without exception, of tuberculosis of the meninges in adults, tubercles exist also in the lungs, and that the same is true, in the vast majority of cases, in regard to children. The organs in which the deposit is most apt to exist are the bronchial ganglions, lungs, mesenteric glands, pleura, and peritoneum.

Another very frequent lesion is softening of the stomach. This may affect only the mucous or all the coats, so that a slight degree of force will suffice to tear the organ. Dr. Gerhard (*Am. Journ. Med. Sci.* vol. xiv, 1834) states, that lesions of the stomach existed in six of the ten cases detailed by him, and in four-fifths of others not detailed.

Before quitting this subject, I would call the attention of the reader to the fact mentioned by M. Valleix (*Loc. cit.* t. ix, p. 214), that all the symptoms about to be described as constituting the disease under consideration, with the exception of paralysis, may depend on simple tuberculosis of the meninges. Several cases have been cited, in fact, in which the only lesion found after death consisted of granulations in the pia mater. No traces of inflammation were observed. It is clear, therefore, that the evidences of the disease, or symptoms, depend not merely on inflammation caused by the tubercular deposits, but on the presence of that morbid production. The paralysis, which is one of the important symptoms, is thought to depend chiefly on softening of the substance of the brain. The author referred to states that it occupies the side opposite that in which the change exists.

On the other hand, it also happens that children die with all the symptoms of the disease, and after death, very few or no granulations are found to account for the inflammatory changes existing in the head, but the tuberculous product is found in other organs of the body, thus establishing the true nature of the case.

SYMPTOMS; COURSE; DURATION.—The disease has been divided by authors into different stages, founded on the predominance of certain symptoms at particular periods of its course.

These divisions are all imperfect and unsatisfactory, because the disease is in fact a continuous one, and for this reason some writers have avoided attempting any classification of the symptoms. We can, however, obtain a more faithful picture of the disorder by adopting the division made by M. Valleix, which, though arbitrary and imperfect, because of the want of a natural line of demarcation, seems warranted by the very great differences in the character of the symptoms at an early and late period of the affection. I shall therefore describe first the invasion of the malady, and then two stages or periods of the symptoms after the disease is confirmed.

The *invasion* of the disease may be either insidious or sudden. In a large majority of the cases, the onset is preceded by a well-marked prodromic period. The length of this period varies greatly in different subjects. Its duration is stated by MM. Rilliet and Barthez to be, as a general rule, between fifteen days and three months, scarcely ever less, and rarely more. During this period, the symptoms presented by the child are those which are usually held to be indicative of a failure in the general health. The nutritive functions especially show disorder. The appetite diminishes, or becomes capricious, there are alternations of constipation and diarrhœa, the body grows thin, the color pales, the gaiety of childhood disappears, and the patient becomes listless, apathetic, and complains of being tired and weak; or he is irritable and peevish, or too mild and gentle; study and exercise both become distasteful, and there is a degree of weakness and debility which, though slight at first, becomes at length so evident as to arouse the attention of the parents, or those who have charge of the child. Besides these symptoms, there is often very great restlessness at night. The only pain complained of is headache, and sometimes abdominal pain. The headache is, in subjects old enough to notice and describe their sensations, often a prominent symptom. It is not constant, but occurs at intervals, and is sometimes severe, and its returns frequent. Fever is not generally present until after the more positive symptoms have fairly begun, and when present is generally slight and fugacious. The emaciation and loss of strength are seldom present to such a degree, in the prodromic stage, as to confine the child to the house. On the contrary, he continues to amuse himself at times, and to walk as usual.

The following is a rapid and summary account of the mode of invasion in the cases that have come under my own observation:

In one case, in a girl six years of age, the invasion was preceded during three months by occasional cough, and irregular attacks of fever, by progressive emaciation, paleness, languor alternating with extreme irritability, disinclination to take exercise, and during the latter part of the time by partial lameness, and in fact by all the signs of general tubercular disease. In another, which occurred in a boy eight years of age, it was preceded for several months by frequent complaints of intense headache, especially after taking active exercise, and by unusual languor, but no other symptoms. The boy was sent to boarding-school apparently well, and was suddenly attacked there. In five cases the meningeal symptoms were developed in connection with those of phthisis, whilst in an eighth they followed a state of general weak health, with dyspeptic symptoms, which had lasted for several months. In a ninth case, a violent convulsion, seemingly dependent on a fit of indigestion, was followed during four months by irregular and diminished appetite, by some loss of strength and flesh, and by frequent attacks of severe headache, and at the end of that time, by the symptoms which denote inflammation of the membranes. In a tenth, after some months of gradual thinning and general debility, a convulsion occurred, also from indigestion apparently. This was recovered from, but a few days afterwards the symptoms of meningitis showed themselves, and followed their usual course. In the remaining cases that I have seen, the invasion was preceded by much less decided prodromic symptoms.

After the different phenomena above described as characteristic of the prodromic stage have continued during a variable length of time, the disease enters into activity, a change which is ushered in by three important symptoms, *headache*, *vomiting*, and *constipation*, to which is added, in a large majority of the cases, slight *acceleration* of the circulation. At the same time the *intelligence* remains perfect, the *strength* is not greatly diminished, the *appetite* is not entirely lost, and the *thirst* is moderate.

First stage.—The headache, vomiting, and constipation persist and become more marked. *Headache* is a nearly invariable symptom in children old enough to describe their sensations, and is therefore very important. In infants its presence is to be inferred when the child carries its hands frequently to various parts of the head, and presses strongly against it, and when the head is constantly rolled from side to side. It is generally frontal, and is usually referred to a point just over one or both brows. In other cases it extends over the whole head. It is commonly severe, so that the child when old enough complains of it spontaneously. In the case of a girl seven years old whom I saw, it was so severe that she cried frequently and bitterly, begged to have the doctor sent for, and submitted willingly to any remedy suggested with a view to its relief. It is thought that the acute, shrill cry of the disease, to which the term hydrencephalic has been applied, depends on the acuteness of this pain. It usually lasts throughout the first stage, and ceases only as the delirium and coma of the second stage come on. *Vomiting* is also a nearly constant symptom. Of 80 cases, collected from different sources by M. Barrier, it was absent only in 15, or less than a fifth. This symptom generally makes its appearance on the first day, rarely later than the second or third, and lasts two or three days, and sometimes longer. In one case that I saw, it lasted eleven days, though it was but slight on the tenth and eleventh. The matters ejected from the stomach consist of the ingesta, and of mucus and bile in various proportions. It is commonly repeated two or three times a day. *Constipation* is even more important as a symptom than the one last named. Of 87 cases it was absent only in 7, according to Barrier. MM. Rilliet and Barthez state, however, that it exists at the beginning only in about three-fourths of the cases. Where there is diarrhœa, instead of constipation, at the invasion, as sometimes happens, the former symptom almost always depends on tubercular disease of the intestine. Even under these circumstances, however, the diarrhœa is sometimes arrested, and constipation substituted under the influence of the cerebral disease. The constipation generally persists obstinately for several days, and then gives way under the influence of purgative medication, or is replaced spontaneously by diarrhœa with involuntary stools towards the termination of the case.

In connection with the three important symptoms just described, there are others, which, though less characteristic, are of much assistance in forming the diagnosis. The child is *dull* and *sad*, or *excited* and *irritable* by turns; he shuns the *light*, or closes the eyelids and contracts the brows when it is thrown upon the face; his hearing becomes painfully acute, so that sudden and jarring sounds distress and irritate him; the *sleep* is restless and disturbed, and accompanied by grinding of the teeth; and he utters from time to time, both sleeping and waking, the peculiar shrill, sharp, and sudden scream, which seems to depend upon internal pain, probably headache, and which has been called by Coindet the *hydrencephalic cry*. The general, as well as the special sensibility, is sometimes, but not by any means always, exaggerated at this time. Rilliet and Barthez met with exaltation of this function only in four of their patients. The *intellectual faculties* remain undisturbed in the majority of the cases during the first few days, and this fact, which is so contrary to what might be expected, is one of the utmost importance in the judgment of the case. I remember being asked by a little girl seven years old, to whom I have already referred, "why it was that she saw double, why she saw two mothers and two doctors?" At the time when she first asked the question there was no perceptible strabismus, but on the following day, I thought I could detect a deviation of one of the eyes from its proper axis, and on the third day, the deviation was very marked, though the poor child still wondered why she saw two objects instead of one. In another case, in a boy five years old, there was no disorder of the intelligence until the eleventh day, when there was slight delirium alternating with somnolence; yet it was clear from the first that the attack would prove one of tubercular meningitis, from the coexistence of violent frontal headache, obstinate vomiting, constipation, slow and irregular pulse, and the absence of other local or general symptoms. In only a fifth of the cases observed by MM. Rilliet and Barthez was there perversion of the intellectual faculties at the invasion. Let us observe, moreover, that even when children present some of these disorders early in the attack, they generally consist only of slight delirium, dulness of the intelligence, slowness and hesitation in answering questions, disposition to somnolence, excessive irritability and peevishness of temper, and what is more important and characteristic than any of these, perhaps, of a certain expression of the countenance, and particularly of the look, which is expressive of astonishment or of the utmost indifference. The look is in fact fixed or staring, like that of one in a mild ecstasy. Even when these symptoms exist, however, at an early period, they not unfrequently alternate with the most perfect clearness of the faculties, so that the physician in private practice, who sees his patient only at long intervals, and for a few moments at a time, should never venture to disbelieve, without due consideration, the account of the mother or nurse as to their occasional presence during his absence, even though never observable during his visit. I knew this to happen in regard to a boy eight years old, whose mother constantly insisted to the physician in attendance that during his absence the child occasionally presented slight delirium, and a wild uncertain expression of the countenance, which made her fear that his brain might be affected. As the child's intelligence was perfect, however, whenever the doctor saw him, he determined that the mother was fanciful through over-anxiety, and ascribed the sickness to a bilious disorder of the stomach. After a few days the case developed itself, and the boy died with every symptom of tubercular disease of the brain.

When disorders of intelligence do not occur in the early days of the attack, they usually make their appearance about or soon after the fifth day.

During the first stage the *coloration* of the face ought to be noticed. It is generally paler than natural, though from time to time a sudden flush of redness may be seen to pass over it. The condition of the *senses* is natural, except that the acuteness of the eye, ear, and sometimes that of touch, are exalted, so that the child avoids the light, starts at sudden or loud sounds, and cries when it is touched or moved. The *respiration* becomes unequal and irregular, and is interrupted by sighing or yawning.

Convulsions rarely occur in the first stage. MM. Rilliet and Barthez conclude that meningitis without complication of tuberculous disease of the cerebral substance, never begins with convulsions. In one of the cases that came under my charge, a severe and prolonged convulsive seizure did occur, however, on the very first day of the attack of the disease. The subject of the case was a boy between four and five years old. The death took place on the eighteenth day, and the autopsy showed no tubercular disease of the cerebral substance. It is proper to state, however, that the child had eaten on the morning of the day that he was attacked, a most unwholesome meal, and it is very possible, as I in fact supposed at the time, that the convulsions were caused by the presence in the stomach of undigested food. When they do occur in tubercular meningitis, they may be limited to the extremities, upper lip, eyeballs, or they may be general. Sometimes the child dies in a convulsion. They are generally much less important as a symptom, according to M. Valleix, than in simple acute meningitis.

The *tongue* remains moist; the *appetite* is not entirely lost; *thirst* is moderate; the *constipation* continues, unless removed by treatment; the abdomen becomes *retracted*, so that its walls approach closely to the spinal column, and allows us to feel the pulsations of the aorta without using more than very slight pressure. The latter symptom comes on gradually and is generally well marked by the sixth day or a little later. MM. Rilliet and Barthez regard it as a very important sign, and state that they have observed it almost exclusively in cerebral affections. They think it depends not upon contraction of the abdominal muscles, but upon retraction of the intestines. I can corroborate, by my own experience, the evidence of the above authorities as to the value of this symptom. It has been very marked in the cases that I have seen.

The state of the *circulation* is of the utmost importance in forming the diagnosis. So true indeed is this, that Dr. Whytt, of Edinburgh, whose description of acute hydrocephalus, published in 1768, has been most highly commended by all recent writers as a singular instance of accurate observation, makes three stages of the disease, each of which is characterised by the state of the pulse. In the early part of the attack the pulse is accelerated, rising to 110, 120, or, according to Whytt, in a few cases to 130 or even 140. At the same time it is neither full nor tense, as a general rule, but rather soft and compressible. This condition of the pulse changes, as we shall find, in the middle period of the disease, and again shortly before the fatal termination. The *heat* of skin is usually moderate at this time, as might be supposed from the state of the circulation.

Second stage.—This stage begins about the time the more marked nervous symptoms show themselves. The headache generally subsides or ceases at the beginning of this period and gives place to *delirium*. This occurs usually somewhere between the sixth and twelfth days. The delirium which occurs has been generally supposed to be always mild and calm. MM. Rilliet and Barthez state, however, that in one-third of their cases it was intense, and accompanied with cries, agitation, and frequent changes of position. In most of the cases, however, it is mild, and is manifested in older children by their muttering unintelligible words, by inattention to what is going on around them, by an expression of wildness and astonishment, and by their giving hesitating answers to questions. In children under two years of age there is no proper delirium. There is, however, an analogous condition, which is characterised by disorder of the two faculties of attention and perception. The delirium seldom lasts more than two or three days, and generally alternates with somnolence, so that the child is either dozing and sleeping, talking in its sleep, or frequently waking with loud cries, and restlessness. The *general sensibility*, which may have been exaggerated in the early period of the disease, is diminished in the early part of the second stage, or about the seventh day, and completely abolished towards the end. The face in the second stage is almost always pale, or pale and flushed alternately. During this stage, and especially during the latter part of it, it is very common to see sudden alterations in the color of the face. Sometimes without any apparent cause, but more frequently from disturbances of any kind, as from pain or from external influences acting upon the child, such as moving it, or the administration of food or medicine, the face becomes suffused of a more or less deep pinkish or scarlet tint, the color beginning faintly at first and gradually deepening and expanding until it covers the whole face and forehead, and then as gradually fading away. It is during this stage also that another symptom, which I have often noticed, and to which M. Trousseau has called attention, may usually be observed. M. Trousseau refers to it as a red line or spot remaining upon the skin of the forehead or abdomen when the finger has been drawn across it, and has given to it the name of "*tache méningitique,*" or "*tache cérébrale.*" I had often remarked, before knowing that M. Trousseau had drawn attention to this phenomena, that the slightest pressure with the finger on any part of the face or forehead, caused the appearance at the point of pressure, of a spot of a peculiar pink or rose color, which, like the flush above referred to, began faintly, became more or less deep in tint, remained a few moments, and then as gradually faded away. This is no doubt one of the diagnostic symptoms of the disease. I do not recollect to have seen it in any other disease, and in this I believe it may always or nearly always be detected. Occasionally contractions pass over the features, giving rise to grimaces, after which the countenance resumes its expression of indifference and stupor. The eyelids are generally only partially closed, and between them the globes of the eyes can be seen to oscillate and move in various directions, as though by some automatic force.

As the case progresses the *nervous symptoms* become more and more marked; somnolence gradually deepens into coma; the delirium becomes less and less frequent; and the child no longer observes what is going on, nor answers questions. As the somnolence and coma increase, various lesions of motility make their appearance, consisting, in order of frequency, of paralysis, which is generally partial, contraction with rigidity of the limbs, stiffness of the trunk, spasmodic closure of the jaws, carphologia, subsultus tendinum, and convulsions. The paralysis is almost always partial and of very limited extent, affecting, for instance, the jaw, the orbicularis muscles of the eyelids, the levator of the upper eyelid, the tongue, or one side of the face. It is very rare to see one of the limbs paralyzed. Contraction with rigidity of the muscles is an important symptom, but is not always present. When it exists it generally appears at an advanced period of the attack, commonly between the seventh and thirteenth days, and is usually partial. It may affect either the extremities, trunk, or inferior maxilla. It is seldom permanent, but after lasting one or two days, disappears, to reappear at a later period. The carphologia, subsultus, and chewing motion of the under jaw generally occur only a few days before death, and last but a few days.

The *decubitus* in the early part of the second stage is generally lateral, with the thighs flexed upon the pelvis, the legs upon the thighs, the arms applied against the thorax, the elbows bent, and the hands placed in front. At this time the child will still occasionally move its position with facility, showing that strength is not by any means entirely lost. At a still later period the decubitus is dorsal. In the latter part of the first and early part of the second stage, the *pulse*, which we have ascertained to be accelerated at the invasion, falls to the natural standard, or becomes slow, and at the same time irregular. From 110 or 120, as it was, it now sinks to 90, 80, 60, or, as happened in one instance to M. Guersant, to 48 in the minute. Coincidently with this change it almost always becomes irregular. The irregularity affects both its force and quickness, so that a strong pulsation may be followed by a feeble one, or the rhythm may be regularly or irregularly intermittent. The irregularity varies greatly at different periods of the day, or within short spaces of time, so that the pulse is found to be very slow at one moment and much more frequent the next. On this account it is necessary to examine it on different occasions. Slowness and irregularity of the circulation are important as a means of diagnosis, since it has very rarely been met with as a permanent condition, except in the tuberculo-inflammatory affections of the brain and its appendages. Towards the termination of the disease, generally speaking two or three days before death, the pulse rises again in frequency, so that it counts at first 112 or 120, and gradually increases to 140, 160, or even 200, the day before, or that on which death takes place. Simultaneously with this change it also becomes extremely feeble and small, and often ceases to be perceptible at the wrist on the last day. The *heat* of skin increases with the acceleration of the pulse. During the last few days the surface is often covered with an abundant perspiration; the tongue becomes dry; the teeth and gums are fuliginous; the exhaustion increases; the respiration becomes stertorous, unequal, difficult, and anxious, and at the very last attended with great dyspnœa; and the urine and stools are discharged involuntarily. Death finally occurs in this condition, or is hastened by an attack of convulsions. In some cases it is most lingering. In one instance I expected the death of a young child in this disease every day for eight in succession.

The *duration* of tubercular meningitis is exceedingly variable in different cases. As a general rule it lasts between eleven and twenty days, though it may continue a considerably longer time. Rilliet and Barthez have never known death to occur before the seventh day.

DIAGNOSIS.—The diseases with which tuberculosis of the meninges is most likely to be confounded are simple meningitis and typhoid fever. It might also be confounded, though this is much less probable, with the cerebral symptoms which complicate the exanthemata and some local diseases, especially pneumonia, and to which symptoms, as a group, M. Barrier has applied the term pseudo-meningitis.

The diagnosis between tubercular and simple meningitis will be best understood from the following synoptical table extracted from the last edition of the work of MM. Rilliet and Barthez.

SIMPLE ACUTE MENINGITIS.	REGULAR TUBERCULAR MENINGITIS.
I. The subjects of acute simple meningitis are usually robust and well developed, and present no trace of either internal or external tubercular disease. Born of healthy parents.	I. Subjects of tubercular meningitis delicate, puny, exhibiting often precocious intelligence and sensibility. Have sometimes had, in infancy, enlarged glands or chronic cutaneous eruptions; the parents, or brothers and sisters, often present the signs of tubercular disease.
II. The disease may prevail epidemically.	II. Disease always sporadic.
III. *Condition prior to invasion.*—The disease begins in the midst of the most blooming health, or, if secondary, it occurs in the course of, or during the convalescence from, some acute non-tubercular disease, or it follows an external cause.	III. *Condition prior to invasion.*—For some months or weeks the patients grow languid, lose their strength, become pale, emaciate; their temper changes, they are dull, they lose appetite, the digestion is deranged, &c. Absence of prodromic symptoms is rare.
IV. *Mode of invasion.*—Violent convulsions attended with intense febrile movement, and with very hurried respiration in young infants; or very acute frontal headache, accompanied by fever, bilious vomiting, and towards the end of the first, or in the course of the second day, at the latest, excessive restlessness, preceded or not by somnolence; most violent delirium; formidable ataxia.	IV. *Mode of invasion.*—Never with convulsions at the onset; the change from the prodromic to the acute stage sometimes imperceptible. It takes place by a progressive increase of the symptoms before mentioned, and by the setting in of headache; in other cases, the acute stage is better marked by headache, vomiting, and constipation; generally, the intelligence remains clear; no ataxia. In the rare cases in which there is ataxia at the onset of the acute symptoms, the prodromic stage, above described, has been observable, or the meningitis has occurred in the course of advanced phthisis. In cases in which no prodromes exist, the meningitis begins with vomiting, constipation, moderate headache, and slight febrile movement; ataxia, if it is to appear, occurs later, and a mistake is impossible.
V. *Symptoms.*—*Very intense* headache, *obstinate* vomiting, *moderate* constipation, *violent* fever, *high* delirium.	V. *Symptoms.*—Not *very intense* headache, vomiting *less frequent*, *very obstinate* constipation, *very moderate* fever, slowness and irregularity of the pulse, delirium usually mild.
VI. From the beginning, the aspect of a grave disease of ataxic form.	VI. Invasion insidious, with the aspect of a mild disease.
VII. Course rapid, aggravation progressive and continuous; convulsion after con-	VII. Course slow, preservation of the intelligence to an advanced period, fever

vulsion, or else violent delirium, extreme agitation, violent fever, &c.	slight, and some slowness and irregularity of the pulse, sighing, changing color of the face, eye dull or ecstatic, &c.
Duration.—Disease of short duration, ending sometimes in twenty-four or thirty-six hours, but lasting generally from three to six days, and seldom more.	*Duration.*—Always much longer in the regular form.

Before quitting the subject of the diagnosis of these two affections, it is desirable to state for the information of the reader, that some of the highest authorities acknowledge it to be sometimes nearly or quite impossible to distinguish between them. This is the expressed opinion of MM. Guersant, Rufz, Barrier, and Valleix.

From typhoid fever tubercular meningitis is to be distinguished by the antecedent history of the patient, which often reveals the existence of a tubercular diathesis in the latter affection; by the symptoms of the invasion, which in meningitis consist of severe and persistent headache, frequent vomiting, and constipation, whilst in typhoid fever the headache is less severe and less persistent, the vomiting much less frequent, and the constipation replaced by diarrhœa; by the different characters of the febrile movement, which, in typhoid fever, is more marked, and attended with a frequent, full, and regular pulse, while in meningitis it is less marked and is accompanied after a few days by slowness and irregularity of the pulse; lastly, in meningitis, the constipation is obstinate, the abdomen retracted, and there are various important and characteristic lesions of motility, sensibility, and the senses; in typhoid fever there is diarrhœa, the abdomen is distended and meteoric, there are characteristic rose-colored spots, whilst there are no considerable lesions either of motility, sensibility, or of the senses.

It is unnecessary to do more than allude to the possibility of confounding the disease with the exanthemata, or with local diseases accompanied by cerebral symptoms, and particularly with pneumonia in very young children. The diagnosis must be made by careful consideration of the symptoms peculiar to each, and in the case of a local disease, by accurate physical examination of all the important organs of the body.

PROGNOSIS.—M. Barrier, in speaking of the prognosis of this affection, says: "The gravity of tubercular meningitis is not surpassed by that of any other disease. Thoracic and abdominal phthisis, though almost constantly fatal, pursue a slower course, and last a longer time. We may even allow as proved, that in a small number of cases, they are susceptible of cure, or may remain stationary for months or years. Unfortunately it is not so in regard to tubercular meningitis." MM. Rilliet and Barthez, in their second edition, do not express the same entire hopelessness as to recovery from the disease, that they did in their first. They say, amongst other conclusions (*Loc. cit.* t. iii, p. 510), that there are on record incontestable examples of the complete disappearance of the symptoms, but remark, that such cures have occurred in the first stage, or in the first half of the second stage, after seven or eight days of sickness, rarely later, and after alternations of amelioration and aggravation. They state also that, in excessively rare instances, a return to health has been obtained even in the course of the third stage, after many weeks of illness. They are of opinion that the disease often returns and proves fatal in from one to five years and a half after the recovery. The cause of the relapse is to be found in the fact that the local lesion remains, and that the diathesis has not been eradicated. M. Valleix is of opinion that after having acquired the conviction that a case is really one of tuberculosis of the meninges, we should regard the patient as lost; "for the exception that I have mentioned (a case belonging to M. Rilliet, then unpublished), even did no doubt as to the exactness of the diagnosis remain, ought not, standing by itself, to impart to us any real security." M. Guersant (*Dict. de Méd.* t. xix, p. 403), seems to think it possible that the disease may sometimes terminate favorably in the very early stage, but adds that "such cases are always more or less doubtful, and seem to us to belong rather, for the most part, to simple meningitis." During the second period (that of slowness and irregularity of the pulse), he has scarcely seen one child in a hundred survive, and even then they perished at a later period of the disease, or of phthisis pulmonalis. Of those arrived at the third stage (marked by renewed frequency of the pulse, coma, and lesions of motility and sensibility), he has never seen any recovery, even momentarily. Dr. George B. Wood (*Pract. of Med.* vol. ii, p. 365), states that he has "never seen a well-marked case of tuberculous meningitis end favorably."

I shall quote but one more authority as to the prognosis of the disease. Dr. Robert Whytt (*Works of Robert Whytt, published by his son*, quarto, Edinburgh, 1768, p. 745), says: "I freely own, that I have never been so lucky as to cure one patient who had those symptoms which with certainty denote this disease; and I suspect that those who imagine they have been more successful have mistaken another distemper for this." My own experience coincides with the mass of evidence given above as to the almost hopeless fatality of the disease. The twenty-three cases that I have seen all proved fatal. A case, however, came under my observation, in 1850, which might, perhaps, be classed as a recovery from tuberculosis of the meninges, though not from tubercular meningitis, since there were no well-marked signs of inflammation of the membranes of the brain, though there was every reason to suppose that the symptoms depended on the deposit of tubercles in those membranes. The case was as follows: A girl between four and five years old, whose mother was then laboring under tubercular disease of the summit of one lung (which has since proved fatal), and who had lost several brothers and sisters with consumption, had had nearly constant cough during the winter of 1849–50. During the months of April, May, and June, of 1850, she had exhibited all the signs of induration over the upper two or three inches of the right lung, before and behind,—marked dulness on percussion and bronchial respiration, but no râle. For these symptoms she had been treated with cod-liver oil, iodide of iron, opium for the cough, and good diet. From the middle of June she complained frequently of headache, had occasional vomiting without any gastric derangement, and was much disposed to be constipated. She had no appetite, grew thin, and was very languid, listless, and weak. On the 27th of June the mother thought she observed some squinting. On the 29th I found that the child had lost all power over the right muscles of the right eye, so that when she looked towards the right hand, she squinted dreadfully. She was dull and heavy, and vomited two or three times a day. The pulse was 62 to 75 or 80; there was a slight hitch in its beat, but no decided intermittence. The child said that she sometimes saw two things instead of one. From this time until July 7th, she continued in much the same state. On the 1st July, finding that the eyes were quite yellow, and that the child was constipated, I ordered half a grain of calomel morning and evening. After three doses she was purged. This relieved her a good deal, there being less headache, more appetite, and an improvement in color afterwards. But still there was every day some vomiting, complaints of headache, and more or less listlessness and heaviness in the morning, while in the afternoon she would brighten up and seem better. The intelligence continued perfect; the temper was rather irritable, but not very much so.

The treatment after the 29th of June was calomel, given as above stated, from time to time, to keep the bowels soluble; cod-liver oil, a teaspoonful twice or three times a day, as the child would take it; mustard foot-baths every day or two; and meat, bread, and ice cream for diet. On the 5th July I ordered half a grain of iodide of potassium, three times a day, in addition to the oil.

On the 11th July, she was taken, by my direction, to the sea-side, where the use of the oil and of the iodide of potassium was to be continued.

On the 7th of August she was brought back from the sea-side, and I saw her on the 8th. I was astonished to see how well she looked. The strabismus had entirely disappeared. I was told that it had begun to diminish two weeks after her arrival at the sea, and had then gradually disappeared. She had grown somewhat, though not very much, fatter. Her whole appearance was very much improved. The coloration of the body, the expression of the face, were both much better; she was much stronger, running about, in fact, all day; she ate well, and with the exception of a little cough, and a rather delicate frame, looked very well. Except one day, she was well all the time at the sea-shore. On that day she was feverish, had much headache and vomiting, and laid abed. The cod-liver oil and iodide of potassium to be continued.

This child remained pretty well throughout the winter of 1850–51. There was no return of either the strabismus or the vomiting. She was thin, pale, and delicate-looking, coughed occasionally, and the solidification of the summit of the lung continued, but she was not confined to the house. Late in the winter she went south with her mother, and there, after having become quite stout and healthy during their travels, died of dysentery in April or May. The mother died in 1852 of phthisis, with large cavities in both lungs. Another case in which the early symptoms of the disease were well marked, and in which recovery took place, will be detailed in the remarks on prophylactic treatment.

I have seen but one other case which gave me the least reason for hope, after I had once supposed the child attacked with the disease. This occurred in a boy eight years old, who had been suffering for two weeks before I saw him with violent frontal headache, frequent vomiting, constipation, slight fever, and somnolence. I fully expected that this would prove to be an attack of tubercular meningitis. A large dose of calomel followed by castor oil, and free leeching to the temples, relieved him in two days perfectly, and he has remained well ever since, though this was nearly twelve years ago.

Are we then to abandon all hope of deriving any good from medical means in the disease under consideration? To this most serious question we ought clearly to respond in the negative. The grounds for entertaining hope are first, the evidence of M. Guersant that he has seen cases which appeared to be tubercular meningitis recover in the first stage. Let it be supposed, even, that they were cases of simple inflammation. But they were undistinguishable from the tubercular disease by one of the most celebrated of modern physicians. Surely, therefore, it may happen to men of inferior skill to meet with the same difficulty, or if I may so speak, to make the same mistake, if a mistake was made. It is said by M. Valleix, that M. Rufz, after determining at the autopsy, that a case which he had witnessed was one of simple meningitis, asserted that it would have been impossible to distinguish it from the tubercular disease during life. Again, M. Rilliet has, according to M. Valleix, seen one case of recovery from what he believed to be the tubercular affection, and MM. Rilliet and Barthez, in their second edition, as above quoted, asserts its occasional curability. I know of the occurrence of a case in this city, under the charge of one of my friends, than whom I believe no one can be more competent to make a correct diagnosis, in which, after the child had presented in regular order all the early symptoms of the disease, and had arrived at the last and most hopeless stage, perfect recovery, to his utter amazement, gradually took place. This child, when my friend last heard of it, three months afterwards, was in all respects strong and hearty. No doubt the probabilities are that the case was one of simple meningitis, but who could have known this at the time; and should it not deter us from abandoning all hope, and, as a consequence, all active treatment, when we seem to have under our hands a case of this dreadful malady. My own cases, given above, also go to prove that the disease is sometimes curable in its early stages.

It is important, in tubercular meningitis, to avoid making a positive prognosis as to the period at which death will occur, notwithstanding that the patient may present every mark of an immediately fatal termination. I have already adverted slightly to this subject. On one occasion I expected the death of a patient with this malady for three days in succession, and on another, I visited a child for a week, during every day of which it seemed as though existence could not endure until the next. It had during this time profound coma, subsultus tendinum, and enlarged pupils; the eyelids were half open, the eyes constantly oscillating, or else rigidly distorted, and both corneas dimmed and slightly eroded, from constant exposure to air and light. Convulsions occurred from time to time, the pulse was variable and at times exceedingly frequent, and indeed everything threatened a speedy termination. MM. Rilliet and Barthez say, "Often have we inscribed upon our notes *death imminent*, and been astonished the next day to find still alive, children to whom we had allowed scarcely two hours of life."

The symptoms which most positively indicate the near approach of death are, livid color of the face, sweats occurring about the face, glassy expression of the eye, dry and incrusted nostrils, and especially a very rapid pulse, and the various nervous symptoms mentioned, as carphologia, subsultus tendinum, and general convulsions.

TREATMENT.—The methods of treatment which have been proposed at different times having so generally failed to do good, it becomes very difficult and embarrassing to determine what ought to be recommended. As, however, there can be no doubt that simple meningitis has sometimes been mistaken for this affection, and as the state of the diseased organ after death proves the existence of an inflammatory element in the disease, it would seem most reasonable to employ the antiphlogistic plan, until more extended observation and greater experience shall either discover another and better method, or show the entire futility of this. By this method we at the same time do what is most proper should the attack chance to prove one of simple inflammation, and employ the means most likely to remove the inflammation of the meninges which accompanies and is the consequence of the tubercular deposit. Moreover, from all that I have read and seen, it seems to me that whenever cases have been reported as cured or even only ameliorated, it has been under a moderate use of antiphlogistic remedies, including calomel, and the employment of more or less powerful counter-irritants.

In the first stage, the treatment ought to begin with *bloodletting.* It is preferable always to employ venesection, unless there be some positive contraindicating circumstances. This is the expressed opinion of most writers. Some recommend opening the jugular vein as the most direct means of acting upon the cerebral circulation, while others propose that the operation be performed in some of the veins of the inferior extremities, as effecting a useful derivation at the same time that it yields the requisite amount of blood. For my own part I have been satisfied to bleed at the usual place, unless there was some difficulty in finding a vein, in which event I have had recourse to the vessel running over the inner malleolus. The quantity of blood to be taken must depend on the age, constitution, and previous health of the patient. When the child is over two or three years old, with the appearances of good health, the quantity may vary between four and eight ounces; in younger children it should rarely exceed four. The bleeding may be repeated if the pulse continues tense and the flushing of the face fails to subside after the first operation, or we may resort to leeches or cups. MM. Rilliet and Barthez prefer local to general bleeding, and recommend that the leeches be applied to the anus or inferior extremities, in order to obtain a derivative as well as depletory effect. Where all remedies are of so little avail as they seem to be in the disease under consideration, it is difficult to decide on the most proper course, not only as to the selection of means, but as to the extent to which they are to be employed. It would seem, however, that the advice given by the authors just quoted, to employ bloodletting only at the invasion of the disease, is the most prudent. They state that "employed in the second and particularly in the third stages, their inevitable effect is to increase the nervous symptoms; the delirium becomes more violent, and the coma, if it existed, augments; we have several times observed this." Dr. Gerhard, whose opinions on this subject are deserving of great weight, advises that local bleeding be directed "so long as the patient can bear it, that is to say, until he becomes pale, and the flush is gone, whether the other symptoms abate or not." (*Clinical Lect. by Graves and Gerhard,* Phil. 1842, p. 473.)

After bleeding it is proper to employ some kind of *counter-irritation,* which may consist of blisters applied to the nape of the neck, or behind the ears, to be kept discharging for several days, of sinapisms to the extremities, and of mustard foot-baths. To be of any probable service these remedies ought to be perseveringly and patiently employed for several days, or during the whole of the second stage.

The head is to be kept cool by means of *cold applications,* consisting of cloths wet with cold water, of affusions with cold water, or, as has been proposed by M. Guersant, by the use of irrigation as employed in surgery. M. Guersant prefers this mode of applying cold to any other, believing it to be the most convenient and comfortable to the child, and from its continuous action, the most efficacious. To make use of it the hair is to be shaved or closely cut, and the child placed upon a mattress without a pillow, and with its head near the edge of the bed. The head is then covered with compresses of soft rag, or better still, of patent lint, while under it is placed a piece of oiled silk, or india-rubber cloth, so arranged as to keep the thorax from being wet, and doubled into a gutter above to convey the water off into a vessel placed on the floor. A bucket or basin filled with fresh, cool water, is placed near the head of the bed, and from this a syphon made of lint or lamp-wick is so arranged as to convey a stream of water upon the compresses covering the head. If the heat of the whole body falls so much as to threaten collapse after the irrigation has been continued for some time, the stream of water should be stopped, and compresses, merely wet with water not quite so cool, kept on the head. The latter precaution is necessary in order to prevent injurious reaction from the sudden and total removal of so powerful a sedative as irrigation proves to be.

Some practitioners prefer the use of ice in a bladder. This seems, however, too severe a remedy to be long continued, and I would therefore rather use only cloths wet with iced water, or irrigation. Dr. Abercrombie is of opinion that the application of cold is by far the most powerful local remedy that we have. M. Gendrin recommends cool or cold affusions over the whole surface, the temperature to be proportioned to the heat of the skin. When there is but little heat of head, only a slight febrile movement, and the headache is not relieved by cold application, Guersant recommends the substitution of warm poultices to the scalp, in the place of irrigation or cold applications.

Purgatives ought to be employed so as to secure a moderately free state of the bowels. To use them to such an extent as to procure very frequent and watery stools, with the view of obtaining a strong derivative action upon the intestinal mucous membrane, can only, it has appeared to me, be injurious, by increasing the febrile reaction and nervous disorder already existing. Dr. Abercrombie, it should be stated, however, regards purging as the most efficient treatment that can be employed. He says, "In all forms of the disease, active purging appears to be the remedy from which we find the most satisfactory results." He recommends the use of croton oil. Calomel, on account of its powerful antiphlogistic and sedative action, is the best purgative to be given at an early period of the disease. From two to eight grains, according to the age of the child, may be exhibited in a single dose, to be followed in several hours by some other purgative. This may be castor oil, jalap, magnesia, rhubarb, extract of senna, or salts.

Remedies of this class should be repeated from time to time throughout the case, according to the condition of the bowels.

Besides antiphlogistics, counter-irritants, and evacuants, which have just been considered, there are two other remedies which have obtained some reputation in the treatment of the disease. These are *calomel*, given as an alterative, and *iodine*. Calomel is highly recommended by most of the English writers on acute hydrocephalus, and is asserted to have effected cures when it has been pushed to such an extent as to produce salivation. But little dependence, however, can be placed on these assertions, as in all probability, the reported recoveries occurred in cases of simple meningitis. The French writers, whose correctness of diagnosis is probably more to be depended upon, speak of having used it in very large quantities without any success. It was given to many of the patients of MM. Rilliet and Barthez, in the quantity of from six to ten, increased to twenty grains, in twenty-four hours, in connection with frictions with mercurial ointment, of which two drachms and a half were used at first, and the quantity afterwards doubled and trebled. They state that salivation did not occur in any of the cases, though fetor of the breath and inflammation of the gums were of frequent occurrence. Calomel may be given, as has been remarked, in purgative doses, at the beginning, and for the purpose of procuring its specific effects. With the latter view the dose may be from a quarter of a grain to a grain, every hour or two hours. Mercurial inunction, in conjunction with the internal administration of the remedy, has been highly recommended by several writers as an efficient means of procuring the full effect of the drug upon the constitution. About a drachm of the ointment is to be rubbed into the insides of the arms and thighs morning and evening, and the quantity gradually increased if no effect is produced. For my own part, I will merely state that I have never known calomel given in large quantities, in order to procure salivation, of the least benefit in the disease. On the contrary, I cannot but think that the violent irritation of the digestive mucous membrane which it has determined, whenever I have used it largely, and the inflamed, irritated condition of the mouth which it caused in one case, must have been a serious aggravation of the state of disease under which the constitution was laboring. Mercury is well known to be an injurious and dangerous remedy in the tubercular diseases of adults, having for its effect to increase the dyscrasia of the constitution, which always exists, and thereby to hasten the progress of the malady. Why it should have a different effect in children is difficult to understand. It may be said, to be sure, that in the disease we are considering, it is given to overcome the inflammatory element of the malady, which, for the time, constitutes the danger of the case, and also to allow the patient the chance of its beneficial operation should the disease happen to be one of simple meningitis. My own plan, in a case which I believed, after mature and careful consideration, to be one of tuberculous meningitis, has been to use mercury merely for its temporary sedative action, and not in the large quantities recommended with a view of obtaining its peculiar action, and thus I shall continue to use it, at least until further evidence of its utility is brought forward. In support of the view just expressed, I will quote the opinion of Dr. John Abercrombie (*Diseases of the Brain and Spinal Cord*, Philad. ed. 1831, p. 173–6): "Mercury has been strongly recommended in that class of cases which terminates by hydrocephalus, but its reputation seems to stand upon very doubtful grounds. In many cases, especially during the first or more active stage, the indiscriminate employment of mercury must be injurious. . . . . In the preceding observations, I shall perhaps be considered as having attached too little importance to mercury in the treatment of this class of diseases, particularly in the treatment of hydrocephalus; but in doing so, I have stated simply what is the result of an extensive observation, ... and I confess, the result of my own observations is, that when mercury is useful in affections of the brain, it is chiefly as a purgative."

It has been recommended within a few years, by Sir B. Brodie, to employ mercurial inunction as especially applicable in using mercury for children. He advises that a drachm or more of the ointment be spread upon one end of a flannel roller, which is to be applied, not very tight, around the knee; repeating the application daily. "The motions of the child produce the necessary friction; and the cuticle being thin, the mercury easily enters the system." The editors of the journal in which this communication is made (*Braith. Retrosp. of Med.* vol. iv, 1846, p. 147, from *Quart. Med. Rev.* July, 1846, p. 169), state that they tried this plan in a case of acute hydrocephalus, in which some of the most urgent and fatal symptoms were present, "such as very dilated pupils, constant convulsions, hemiplegia, and more or less stertorous breathing; in short, so violent were the symptoms, that we considered the case perfectly hopeless; but on reflecting on Sir Benjamin's method, we ordered strong mercurial ointment to be smeared on each leg, every twelve hours, and covered with a stocking, made to tie tightly above the knees. The symptoms soon began to abate, and by following this up with small doses of iodide of potass., frequently repeated (gr. i, every three or four hours), the head symptoms vanished.

"In a second case, the same set of symptoms were approaching, but were stopped by the same mode of treatment."

It has been proposed to employ iodine, because of its good effects in different scrofulous and tuberculous diseases. I am not aware of its having been tried in any considerable number of cases. M. Rilliet, however (*Loc. cit.* t. iii, 1847, p. 808), states that it has entirely failed in his hands in the tubercular form of the disease; the only influence which it seemed to exert was to cause the immediate suspension of the coma. This was its effect also in a case in which I employed it, that of a girl seven years old, to whom I gave two drops of Lugol's solution three times a day, from the thirteenth to the twentieth day, when she died. The day before her death she seemed to improve somewhat, and I was in hopes that it had been of some service. The amelioration did not continue, however, and I am now disposed to believe that the change was one of those which often take place naturally in the disease. In another case of a boy five years old, I gave it in the form of the iodide of potassium, a grain four times a day, from the tenth to the eighteenth day, when he died. I could not perceive that it exerted the least influence on the progress of the disease. It is, nevertheless, a remedy which ought to be tried. I am in the habit of employing it in doses of a grain every three or four hours for children two years of age. It ought to be begun with as soon as the acute symptoms have been sufficiently reduced by bloodletting and purging, and continued in connection with counter-irritants and cold to the head.

When the convulsive symptoms are violent and distressing, they may often be moderated by the use of a warm bath, which must be carefully given, and by the administration of some of the *antispasmodics*. I prefer for this purpose the fluid extract of valerian, of which from ten to twenty drops may be exhibited every two or three hours to young children, and a larger dose to those who are older.

As a general rule, *narcotics* of all kinds are to be avoided, from their effect of increasing the constipation, and exciting more or less the cerebral circulation. When, however, neither antiphlogistics, evacuants, nor cold or warm applications relieve the sufferings of the child, it would be proper to employ small laudanum poultices or opium plasters upon the forehead or temples, or we may use morphia by the endermic method.

The treatment described in the preceding pages, is that which is proper for cases of the disease occurring in subjects previously in good health, or evincing but few signs of the tubercular cachexia. When, on the contrary, it occurs in children with extensive tubercular affections of other organs, by which they are already weakened and exhausted, the treatment must of course be modified to meet the circumstances of the case. It ought to consist chiefly of local bleedings used with great moderation, of purging when constipation is present, of counter-irritants, of cold applications, and of an early use of cod-liver oil, of iodine, or of the iodide of iron. We should recollect that experience has long since shown the weakness of our art in such cases, and for that reason avoid such a degree of interference as might possibly abridge the little span of life allowed the patient by this relentless malady.

PROPHYLACTIC TREATMENT.—It must be evident that the prophylactic treatment is of especial importance in a disease so little amenable to curative means as the one under consideration. When therefore there is reason to suspect a tendency to tubercular meningitis in a child, either from the fact that other children in the family have perished with it, or from a bad state of the general health and frequent complaints of headache, it becomes proper and necessary to regulate both the moral and physical education with a view to its prevention. For this end the hygienic management of the child ought to be such as is best calculated to prevent the formation or development of tubercles in the constitution. During infancy, such a child should be nursed, if this be possible, by a strong, hearty woman, with an abundant flow of milk. If the mother is not possessed of these qualities, if there be, indeed, the least doubt upon the point, she ought without hesitation to give up the pleasure of nursing the child herself, and procure for it a wet-nurse of the kind described. This alone will, in all probability, often make the difference between a vigorous and fragile constitution. When the time for weaning arrives, the change ought to be made with the greatest care and circumspection. During and for some time after weaning, the diet must consist principally of milk preparations and bread, and of small quantities of light broths, or of meat very finely cut up. As the child grows older, the meals ought to be arranged at regular hours, and should consist of four in the day. The principal food must be bread and milk, well-chosen, well-cooked meats, and rice and potatoes as almost the only vegetables. After the first dentition is completed, a moderate use of ripe and wholesome fruits may be allowed, but always with care, in order to avoid injury to the digestive organs, and also so as not to mar the appetite for more wholesome and nutritious food. Coffee and tea ought to be forbidden at all times. It is best that the child should not even taste them, so that it may not be tormented with the desire of having what is improper.

After diet the most important points in the treatment are air and clothing. The child should inhabit, if possible, a large, dry, well-ventilated room, which ought to be kept as cool as possible in summer, and moderately warm in winter. Not a day should be allowed to pass, unless the weather is totally unfit, without the child's being sent for several hours into the open air, and I believe that it is much better for it to walk than drive, unless the weather be very hot. The clothing ought to be suitable to the season, cool in summer and warm in winter. In our country there is a great inclination to *harden* children by dressing them very slightly in cold weather; so that they frequently suffer from catarrh, pneumonia, and spasmodic croup, brought on by improper exposure. This cannot but be wrong in a child who shows the least evidence of a tendency to tubercular affections.

For my own part I am fully convinced from what experience I have had of the diseases of children, that by far the most certain and effectual means of preventing the development of a tubercular, or indeed any other cachexia in a child, is to have it brought up in the open country, or in some healthy village, until the epoch of puberty has passed by safely. A very good plan for parents whose occupations compel them to live in cities or large towns, is to have their residence a few miles in the country and to come to town every day. Children brought up in this way have a far better chance of obtaining strong and vigorous constitutions, than those reared entirely in the close and confined dwellings and streets of crowded cities.

When a child, who, from the health of its parents, or from its own appearance, may be suspected of having any tubercular or scrofulous taint in its system, becomes subject to frequent attacks of apparently causeless headache, and especially when such headaches are associated with a constipated habit of body and with occasional vomiting, it ought to be looked upon as threatened with tubercular disease of the brain. Under these circumstances I would advise that, in addition to the measures just now recommended as to diet, dress, exercise in the open air, and a residence in the country, blisters be applied occasionally behind the ears, that it be put at once upon the use of cod-liver oil, iodide of potassium, or iodide of iron, and mild laxatives, and that these be persevered in for several weeks or months, until in fact the strength and general health are restored, and the headaches cease. If the child is of an age to be going on with its education, this should for the time cease, or be carried on in such a way as to avoid all excitement or fatigue. A case occurred to me in the course of the year 1852, which showed, I think, very clearly, the utility of these measures.

A boy between seven and eight years old, whose mother had died of well-marked phthisis a few months before he was put under my charge, had been losing flesh and strength, and suffering from occasional headache, for some time before I was called to see him. I found him in bed complaining of severe frontal headache,—so severe at times, and usually in the after part of the day, as to cause great distress, with crying. The intelligence was perfectly natural. The child was rather dull and listless, from suffering and from weakness, but not from any want of a healthful state of the mental operations. There was no sign whatever of spasmodic or paralytic affection. In the morning the skin was cool and natural, but in the afternoon it became warm and dry, but not very hot. The pulse was 62 to 68, and though not actually irregular, it was halting or hesitating. There was occasional, but not frequent, unprovoked vomiting, and he complained often of sick stomach, even when he did not vomit. The bowels were very much constipated, and had been a good deal so for some weeks previous to his falling actually sick. There was no cough, no sore throat, and no soreness about the abdomen. The tongue was moist, soft, slightly furred, and not red nor gashed. The urinary secretion was healthy. Physical examination showed the lungs and heart to be without disease.

The treatment during the first week was small doses of calomel and rhubarb, half a grain of the former to two of the latter, given for a day, and followed by syrup of rhubarb and fluid extract of senna, until the bowels were copiously evacuated. After this the bowels were kept soluble by the administration every day, or every other day, of doses of Selzer powder, sufficient to produce the effect. Blisters were applied behind the ears. In the after part of the day, when the head and body became heated, cooling applications were made to the head, and the feet were put into mustard water, once, twice, or three times. Two grains of iodide of potassium were ordered to be given three times a day. The diet was to be light, but nutritious. It was to consist of bread and milk and a soft-boiled egg in the morning, oysters or light meats with rice for dinner, and milk with bread in the evening. Of these he was to have any reasonable quantity that he might desire. Under this treatment he improved slowly, with occasional drawbacks, for a week, when the iodide of iron was substituted for the iodide of potassium. The bowels continued very costive, requiring daily doses of the Selzer powder; the headaches diminished in frequency, duration, and severity; the pulse went up to 72 and 78, and became more free and even; the appetite had improved, but the child remained still very weak, pallid, and quite emaciated. After another week, as he continued to mend, and the stomach had become stronger, cod-liver oil was ordered in addition to the iron; a teaspoonful was to be taken three times a day, in a wineglassful of table beer. As he gained strength, the amount and kind of food was increased. He was, indeed, encouraged to eat heartily of plain and digestible substances.

He now improved gradually in health. The headaches subsided, and finally ceased; the bowels became soluble; the appetite grew hearty and strong, and all feeling of nausea disappeared; he regained his strength, flesh, and color, so that at the end of two months, I saw him looking quite fat and well. The iodide of iron and cod-liver oil were, however, to be continued for a month longer. He is now, 1857, in good health, though still rather pale and thin.

As to the particular means likely to be of service in preventing a direction of tubercular cachexia towards the brain, such as might produce tuberculosis of that organ, we have only to propose the course recommended by different writers, viz., to keep the head cool, by not allowing it to be very warmly covered, and by keeping the hair short; to keep the extremities warm; to avoid stimulating the intellectual faculties to any considerable extent by education, until after eight or ten years of age; and to use every means to preserve the general health in a sound and pure condition. Some recommend the long-continued employment of a powerful derivative from the brain, as a small blister on the arm, or a seton in the neck. I think, however, that such remedies ought not to be used unless there are positive symptoms of a tendency to cerebral disorder. The caution not to interfere much with eruptions which nature may have thrown out upon the scalp is, I believe, wise and prudent.

ARTICLE II.

SIMPLE MENINGITIS.

Definition; Synonymes; Frequency.—By this term is understood inflammation of the membranes of the brain, independent of tuberculosis of those tissues, or of other organs of the economy.

The disease was for a long time confounded with tubercular meningitis under the titles of water on the brain, dropsy of the brain, and acute hydrocephalus. It has also been called arachnitis; and more rarely phrenitis.

Its frequency is much less than that of tubercular meningitis. It appears that MM. Rilliet and Barthez, during their researches, met with only five cases of this disease, while they report thirty-three of tubercular meningitis. Bouchut states that he has met with two cases of simple meningitis to six of tubercular disease, whilst Barrier reports only four of the former in nearly thirty autopsies of meningitis. He states, however, that he has met with three cases of recovery, all of which he believes to have been instances of the simple form. Fabre and Constant met with nine cases of simple to twenty-seven of tubercular meningitis in a period of two years, at the Children's Hospital of Paris. (*Bibliothèque du Méd. Prat.* t. vi, p. 166.)

Causes.—The causes of simple meningitis are not very clearly ascertained. It would appear, however, that the disease is more common in infants than older children. M. Rilliet, who has recently published a very valuable paper on this affection (*Arch. Gen. de Méd.* t. xii, 1846), divides it into two forms, the convulsive and phrenitic, the former of which he believes to be most common under two, and the latter between five and fifteen years of age. This author is disposed to think, from the fact that the disease is most frequent in the first and ninth years of life, that the process of dentition has something to do in its production. It appears also to be more frequent in boys than girls, and in robust than in weak constitutions. Guersant has known it to follow long-continued exposure to the sun in several instances, particularly in young infants; MM. Rilliet and Barthez report a case of the same kind, and Rilliet (*Loc. cit.*) another; other causes cited by authors are injuries upon the head, such as blows, falls, and wounds. One other cause I will mention, which ought to be known to every practitioner. This is the attempt to cure chronic eruptions of the head, especially by too active a treatment. A case of this kind is given by MM. Rilliet and Barthez, another by Rilliet, and I am acquainted with one myself.

The disease sometimes occurs in an epidemic form.

Anatomical Lesions.—The dura mater is generally much injected, and its sinuses, together with the large cerebral veins, contain coagulated or semi-coagulated blood, sometimes in large quantities. On opening the dura mater, the whole, or nearly the whole of the convex surface of both hemispheres, or in some instances of one only, are found to be covered with a yellowish or greenish-yellow layer, which consists of fluid or concrete pus, or of false membranes. These deposits exist also on the internal surfaces of the hemispheres, on the upper surfaces of the cerebellum, and often also at the base of the brain, though in some cases the latter presents none whatever. The inflammatory products are seated in the pia mater, and sometimes in the cavity of the arachnoid membrane, but in much smaller quantity than in the tissue beneath that membrane.

The *arachnoid* membrane which covers the brain seldom participates in the inflammation, but remains smooth and transparent. Its cavity, however, often contains inflammatory products, which, when death occurs early in the attack, consist of a small quantity of pure pus, or of larger quantities of a turbid, yellowish serosity, consisting of serum and pus mixed together. When death has occurred later in the disease,—after five, six, or seven days,—the pus is found converted, by the absorption of its fluid particles, into a solid substance, or else true false membranes are found. The *pia mater* is observed to contain fluid or semifluid pus when death occurs before the fourth or fifth day, while at a later period the pus has become hardened, so as to form a layer, which sometimes dips into the anfractuosities, and gives to the membrane under consideration a swelled and thickened appearance. These appearances are more marked on the superior and lateral, than on the inferior surface of the brain. Where the deposits exist the membrane presents a vivid injection, which is more marked in proportion as death has taken place earlier in the disease. The pia mater is generally easily detached from the cerebral substance, particularly when the fatal termination has occurred early. The *substance* of the brain is firm, and but slightly colored, in rapid cases. When the course of the disease has been slower the cineritious portion is generally of a bright rose color, and the medullary substance abundantly dotted with red. In the latter class of cases the surface of the convolutions is sometimes softened, and the pia mater adherent. In very young children, the whole brain is sometimes soft.

The *ventricles* do not, as a general rule, contain transparent serum, except at a very early age, when serous effusion takes place with great facility. They often, however, contain one or two teaspoonfuls, and rarely more than one or two tablespoonfuls, of pus or purulent serum. The serous membrane of the ventricles and the plexus choroides exhibit signs of inflammation in some instances. They are of a bright red color, uneven, rough, and very much softened, in children who die early; and pale, opaque, slightly thickened and rough, in those who die at a later period.

The central parts of the brain often retain their firmness, but are sometimes softer than natural, or even diffluent. This softening is particularly apt to exist in very young children, in connection with large effusion into the ventricles; though it also occurs in those who are older, and in whom there is only slight effusion of pus or purulent serum. In the former case it is probably due to the macerating effect of the effusion, while in the latter it is more likely to be owing to inflammation.

The *spinal marrow* was examined in one case by M. Legendre, and its membranes found to present the same inflammatory appearances which existed in those of the brain.

The other organs are healthy except in secondary cases. Tubercles, which so constantly exist in various other organs in tuberculosis of the meninges, are never found, according to M. Rilliet, in this form of meningitis. This author believes himself entitled from his researches to formulate the following law of pathological anatomy: "That general meningitis and meningitis of the convexity of the brain occur only in non-tuberculous children, whilst meningitis of the base of the brain, without inflammation of the lining membrane of the ventricles, belongs exclusively to tuberculous children." (*Loc. cit.* t. iii, 1846, p. 408.)

SYMPTOMS.—The following account of the symptoms of the disease is taken chiefly from the paper of M. Rilliet. That author describes two forms of the affection, the *convulsive* and *phrenitic;* the former of which is characterized by a predominance of convulsive phenomena, and the latter by disorders of the intelligence.

The disease may also be idiopathic or secondary, simple or complicated, sporadic or epidemic.

The *convulsive form* generally occurs in children under two years of age. The disease usually begins suddenly or after a restless night, with a violent and prolonged attack of *convulsions*, oftener general than partial, and is accompanied by violent *fever*, and sometimes by considerable quickness of *respiration*. The existence of *headache* cannot be ascertained at this early age. *Vomiting* is often absent, and the *bowels* generally continue regular in this form, though they are sometimes constipated. After a while the convulsions cease, and the child remains for the time in a state of quiet, somnolence, or coma, when they return with renewed violence. The returns of the convulsions generally take place at intervals of one or two hours or more. In the intervals between the crises the child is restless or drowsy, or in a state of partial *stupor*, attended with tremulous movements of the extremities; there is *strabismus*, *contraction of the pupils*, *trismus*, and sometimes *hemiplegia*. The skin retains its warmth, the pulse is accelerated, irregular, and unequal; the face is pale; the stools are spontaneous or easily procured by remedies. It is unusual to see the child regain its consciousness so as to recognize objects in the intervals between the convulsions, or after the appearance of coma and other cerebral symptoms. Death occurs during coma or in a violent attack of convulsions. This form seldom lasts more than four days.

M. Rilliet states that this form sometimes begins in a different manner. The convulsions, though they still predominate, do not occur until later in the disease, and the whole course of the affection is slower. Such cases begin with a violent febrile movement, lasting several days, and accompanied by acceleration or unevenness of the respiration, or by almost constant drowsiness, preceded or followed by agitation, screaming, staring expression of the eyes, and dilatation of the pupils; vomiting and constipation are sometimes present, at others absent. After a time, however, convulsions make their appearance, and the case follows the course already described. The duration of this form may be the same as that of the first, or it may last about two weeks.

The *phrenitic form* of simple meningitis generally begins suddenly with fever, which is sometimes preceded by a chill; the skin is warm and dry, and the pulse, in idiopathic cases, full and accelerated. In secondary cases the pulse has been found slow and irregular; in all it becomes irregular, small, and very rapid, the day before death. Simultaneously with the fever there is frontal headache, which is often so violent as to draw cries from the child, and, according to M. Rilliet, is more severe than either in tubercular meningitis or typhoid fever. It is also more constant, and lasts generally one, two, or three days, until the appearance of restlessness, delirium, or coma. At the same time there is great sensibility to light and noise, and abundant vomiting of bilious matter. The latter symptom is one of the earliest; it generally ceases after a few days, but sometimes continues to the very end. Constipation exists in some cases, but is much less constant and more easily overcome than in the tubercular disease. The appetite is lost, and the thirst very acute. The abdomen is flattened and retracted, especially towards the end, while in secondary cases of this form, and in very young children, it retains its usual shape.

About the end of the first day, generally, or, in rare instances, after two or three days, appear various disorders of the intelligence. The first symptom of this kind is observable in the expression of the face, which becomes a little wild or wandering, and sometimes grimacing. Soon afterwards occur restlessness, which is sometimes extreme, and, in succession, delirium, somnolence, and later in the attack, coma. The restlessness and somnolence often alternate early in the case, though the former generally predominates and soon passes into delirium, which is usually violent. When in this condition the child seldom recognizes any one, and either refuses to answer questions, or answers incoherently. In connection with the disorders of intelligence there exist also trismus, grinding of the teeth, subsultus tendinum, partial convulsive movements, stiffening of the extremities or trunk, retraction of the head, strabismus, contraction first and then dilatation of the pupils, and in some cases violent convulsions, followed by deep coma. Death sometimes occurs at this period. In other instances, the disease continues longer, and other symptoms declare themselves. Vomiting generally ceases; constipation increases; the abdomen is retracted; headache is no longer complained of; the fever continues, but the pulse becomes irregular; the respiration is uneven and irregular, being sometimes more and at other times less frequent than natural; the face is distorted and extremely pale, or there may be a purple flush on the cheeks; the restlessness is excessive, and accompanied by subsultus, carphologia, or partial convulsive movements; the delirium, at first so violent as to make it necessary sometimes to hold the child in bed, subsides into a state of coma and collapse, in which general sensibility is obtunded, and special sensibility extinguished; the respiration becomes stertorous, and at length asphyxia, coma, or a severe attack of convulsions terminates the scene.

The course of the disease is generally continuous. In very rare cases, however, occasional remissions occur, so that the child recovers its intelligence for a short time, and recognizes persons around. The duration has varied between a day and a half and nine days.

Diagnosis.—The convulsive form may be confounded with the essential or symptomatic, and with the sympathetic convulsions of children. The mistake may generally be avoided by attention to the following points. In essential convulsions, the attacks are usually less violent, seldom last more than a few moments, occur from some evident cause, and do not recur often. When they have ceased, the child generally soon regains its consciousness and health, or exhibits slight drowsiness, or derangement of movement for a short time only. In such cases the respiration is not permanently accelerated, as in convulsive meningitis; the pulse, if it had been increased in frequency, soon falls to the natural standard, and special sensibility remains undisturbed.

It is to be distinguished from sympathetic convulsions by the characters just described, aided by a reference to the disease which may have caused the attack of eclampsia, and which may be one of the eruptive fevers, enteritis, indigestion, pneumonia, or any other acute affection. In some instances, however, the distinction cannot be made except by attention to the progress of the attack.

The phrenitic form may be confounded with tubercular meningitis, with congestion of the brain, or with the early stage of the eruptive fevers. The distinction between it and tubercular meningitis has already been considered under the head of the latter disease.

M. Rilliet is of opinion that it is sometimes impossible, in the present state of knowledge upon these points, to distinguish with certainty between simple meningitis and cerebral congestion or hemorrhage, and encephalitis.

In regard to congestion of the brain, he proposes the very important question, "Whether we ought to class as meningitis the dangerous cerebral symptoms, resembling exactly those which mark the commencement of meningeal inflammation, and terminating rapidly by death or recovery?" He states that examination after death in these cases reveals neither pus nor false membranes in the arachnoid or pia mater, but simple congestion of the brain and its membranes. He deems the solution of the question to be difficult, but is himself of opinion that they ought not to be classed together. He gives the following table, which he thinks may assist in making the diagnosis.

CONGESTION OF THE BRAIN—MODE OF INVASION.	MENINGITIS.
There occurs instantaneously profound stupor, absolute immobility and insensibility, with dilatation of the pupils; or else acute delirium, with difficulty of breathing, and with acceleration and smallness of the pulse; or in yet another class of cases with tremors or slight convulsive movements of one side of the body. Stuttering, loss of speech, stertorous respiration and pains in the arms and corresponding side of the face exist; the fingers do not retain objects which the child attempts to grasp.	In the phrenitic form the first symptom is generally headache, which is not noted in any of the cases of M. Bland (of congestion). The alterations of intelligence and motion occur early, but not before the beginning of the first or second day; whilst in congestion, the appearance of delirium or coma, of subsultus tendinum, or partial paralysis, is instantaneous, frightful, truly apoplectic, and so far as we can ascertain, not accompanied by vomiting,—a symptom rarely absent in meningitis.

From the invasion of variola, it is to be distinguished by attention to the contagious and epidemic nature of that malady, by the inquiry as to whether the patient has been vaccinated or has had a prior attack of that disease, by the absence of pains in the loins, in meningitis, and by a consideration of the period at which the delirium makes its appearance, which, in variola, rarely occurs before the third day. To make the diagnosis between meningitis and malignant scarlatina, we must attend chiefly to the epidemic and contagious character, to the thick coating upon the tongue, redness of the throat, elevated temperature, and nasal respiration, which exist in the latter.

Prognosis.—The prognosis of simple meningitis is very grave. M. Valleix is disposed to think that most of the recoveries reported by M. Guersant were cases of sanguine congestion or effusion. M. Rilliet (*Loc. cit.*), who has studied the subject more carefully than any other observer, cites several instances of recovery, but states that death is much the most frequent termination. The diagnosis of the disease from other cerebral affections, is so difficult and uncertain, at present, however, as to render it impossible to determine with any certainty, its degree of curability.

TREATMENT.—It must be evident, it seems to me, that but little dependence can or ought to be placed on any but the most powerful *antiphlogistic* treatment. *Bloodletting*, therefore, *mercury*, *cold* applications to the head, *purgatives*, *counter-irritants*, and the most rigid diet, ought to be employed from as early a period as possible, and in the most energetic manner.

Venesection ought always to be preferred to local bleeding, even in the youngest child, unless it is impossible to find a vein, or unless this is evidently too small to bleed well. If we cannot succeed in performing the operation at the bend of the arm, we may resort to the vein running over the inner ankle, or to the external jugular. When venesection cannot, from any reason, be employed, blood should be freely drawn by means of leeches or cups. It is customary to apply the leeches to the temples or behind the ears. I may remark that MM. Rilliet and Barthez object to the application of leeches to the head, and propose that they should be placed rather about the anus, or on the inferior extremities. The quantity of blood to be drawn must depend upon the age and constitution of the subject, and the violence of the attack, in some measure. It should always, however, be large, as much, or more, I think, than what is necessary in any of the acute affections of childhood. In a child two years old, of good constitution, from four to six ounces would not be too much at first, and should the symptoms not moderate in six or eight hours, as much more may be taken. Should these detractions of blood fail to produce a good effect upon the dangerous symptoms, it would be proper, unless there were evident and unmistakable signs of exhaustion, to take still more, either locally or generally. I am disposed to believe that in such a disease as this, bleeding is by far the most powerful remedy, and it is perhaps the only one which offers us any real chance of success, at least in those rapid cases, in which extensive layers of fluid or partially concrete pus and false membranes are found on the surface of the brain, in the pia mater, or in the subarachnoid tissue, in from two days and a half to three or four days after the commencement of the disease. I once took four ounces of blood from a child five weeks old, who was laboring under convulsions and insensibility, occurring in the course of bronchitis, and the child recovered. In another of the same age, with convulsions from congestion of the brain, or possibly from the very disease we are now considering, I removed four ounces in twelve hours by venesection and leeching; in another of seven months, with repeated convulsions, lasting with slight intervals for ten hours, and followed by nearly complete paralysis of the left arm, I took seven ounces in that time; both recovered and were not permanently injured by the loss of blood. I have taken between fourteen and fifteen ounces of blood by venesection from a child two years old, attacked with pseudo-membranous laryngitis, in two days, and fourteen from another chil four years old in the same time, for the same disease, and they both recovered without any injury to their constitution. I mention these amounts, which are larger, I am free to confess, than I have ventured upon of latter years, in order to show that children laboring under acute and dangerous inflammations of important organs, can bear large detractions of blood without injury, and because I know that there is a strong feeling amongst many members of the profession in this city against copious bleedings in childhood under any circumstances.

While the bleeding is being performed we should direct the preparation of means for the application of *cold* to the head, which constitutes, according to all writers, a most efficient remedy in inflammations of the brain and its membranes. These may consist of a bladder containing water and pounded ice, which is perhaps the most convenient and powerful, of cloths wrung out of iced or very cold water, to be constantly renewed, of cold affusions upon the head, or, lastly, of irrigation, as recommended by M. Guersant, and described in the article on tubercular meningitis. *Purgatives* ought to be employed so as to empty the bowels thoroughly, and produce a decided revulsion upon the intestinal mucous membrane, but not in such quantity as to occasion inflammation of that tissue, which would be very apt to prove the case, were the drastic substances and large doses recommended by some writers, used. The remedy usually given and most highly recommended is *calomel*, which is chosen for its sedative and alterative properties. About four grains may be exhibited alone, and followed in one, two, or three hours by castor oil, jalap, or infusion of senna and manna, sweetened with syrup of rhubarb. These doses ought to be given until the bowels are freely moved. It is always useful to employ a strong purgative enema immediately after the bleeding, without waiting for the operation of the internal remedies. After the purgative doses have been given, it is important to continue the mercury in smaller quantities, with the view of obtaining its specific influence upon the inflammation. The doses may consist of from a quarter of a grain to a grain every hour or two hours. Some writers also recommend very highly the use of mercurial inunction.

Counter-irritants are useful as adjuvants to the more powerful remedies already indicated. During the first day or two they should consist chiefly of sinapisms and mustard poultices applied from time to time to the trunk and extremities. Authorities differ somewhat as to the effect of blisters, and as to the time at which they ought to be applied. M. Valleix (*Loc. cit.* t. ix, p. 187), opposes their employment in this affection as often injurious and still more frequently useless. I think the advice given by Dr. Abercrombie as to their employment is probably the most prudent. This is, not to apply them in the early stage, but to wait until the active symptoms of the disease have been subdued. They may be applied to the head itself, to the nucha, or to the extremities. I believe that I have seen them most useful when applied to the neck and insides of the calves of the legs. Nevertheless, there is high authority in favor of their good effects when applied upon the head itself.

M. Rilliet (*Loc. cit.*) recommends a vigorous revulsion upon the scalp when the disease has followed the suppression of an eruption. He proposes with this view the employment of pustulation by croton oil, and relates a case of recovery which followed this treatment under a most unfavorable train of symptoms. To make use of it the head must be first shaved; from fifteen to twenty drops of the oil are then to be rubbed over the scalp with a glove, four or six times a day. Before making the friction, the eyes of the patient must be covered with a band to prevent the introduction of any of the oil into them, as this would be apt to occasion severe ophthalmia. In the case reported by him a considerable number of pustules were produced in twenty-four hours, and in a few more hours the eruption was general, so that the head was covered with a kind of cap of a fine yellow color.

ARTICLE III.

ACUTE HYDROCEPHALUS.

Under the term hydrocephalus were formerly included all the cases of disease of the brain attended with effusion of serum into the ventricles, into the cavity of the arachnoid or pia mater, or with infiltration of the cerebral substance. Recent observations have shown, however, as has already been stated in the two previous articles, that in the immense majority of cases the serous effusion within the cranium depends upon tuberculosis of the membranes of the brain; and that of the remaining cases the greater part are the result of simple meningitis, or of some other disease of the brain. In some few instances, however, effusion undoubtedly takes place independently of inflammatory action, and it is to these that the title of acute hydrocephalus is now generally applied. It ought to be observed, however, that the disease is almost always secondary, and that some writers, and amongst them MM. Guersant and Blache, Valleix, and Rilliet and Barthez, without denying the possibility of the occurrence of idiopathic cases, are evidently of opinion that they are *extremely* rare, and that their existence even may be doubted.

Definition; Synonymes; Frequency.—By acute hydrocephalus is now generally understood, at least by the French writers, a disease in which a rapid but non-inflammatory effusion of serum takes place into the ventricles of the brain, and less frequently within the cavity of the arachnoid membrane, or through the substance of the brain.

It has already been stated that under the title of acute hydrocephalus were formerly, and are yet by some persons, confounded, tubercular and simple meningitis, and indeed all acute lesions of the brain attended with serous effusion.

It is an affection rarely met with in comparison either with tubercular or simple meningitis. Several high authorities even deny its existence as an idiopathic disease, while all acknowledge it to be infrequent even in the secondary form.

CAUSES.—As even the existence of idiopathic acute hydrocephalus is doubted by many, and denied by not a few observers, its causes are of course but little understood. The cases of the disease met with, therefore, are secondary. These may occur in the course of any disease liable to be complicated with anasarca, and particularly scarlet fever, measles, nephritis, gangrene, and entero-colitis. It is said to occur generally under six years of age, and with equal frequency in both sexes.

ANATOMICAL LESIONS.—MM. Rilliet and Barthez state that they have rarely found more than from two to four ounces of serum in the ventricles, which are more or less dilated, and about the same quantity in the cavity of the arachnoid. The internal and external cerebral membranes, generally pale or of their natural color, sometimes present a bright injection, thus showing the transition from simple dropsy to that which is the result of inflammation. The same authors describe the cerebral substance as healthy and natural, or as presenting more or less considerable punctuation or congestion. In some instances it participates in the dropsy, and the parts adjoining the effusion are softened and of a creamy consistence. This is particularly observable in the walls of the ventricles when the serum has been effused into those cavities.

SYMPTOMS.—The symptoms of acute hydrocephalus, like the rest of the history of the disease, are very imperfectly understood. MM. Rilliet and Barthez, with Guersant and Blache, are of opinion that it is difficult and even impossible to establish any characters which indicate the presence of acute hydrocephalus. The only symptoms they have been able to refer to it are, excessive agitation, cries or constant moaning, replaced a short time before death by extreme prostration, with somnolence, loss of consciousness, and coma, or even general insensibility, dilatation of the pupils, and fixity of the look.

M. Barrier states that the disease appears under two different forms. In the first, the effusion takes place gradually, the symptoms are very analogous to those of the invasion of meningitis, and are characterized by phenomena of excitation, such as headache, delirium, restlessness, screaming, and convulsive movements. This period lasts from a few hours to several days, but very rarely so long as the first and second stages of acute meningitis united. In the second period of the first form of hydrocephalus now under consideration, the preceding symptoms give place to abolition of the intelligence and senses, to coma, amaurosis, deafness, insensibility of the skin, and cessation of all voluntary movements. The latter symptom, however, is not constant; for it often happens that violent convulsions occur in the midst of the state of collapse.

In the second form of hydrocephalus, the first period above described is wanting, and the phenomena of the second period appear from the first. This form might with some propriety be called serous apoplexy. It is particularly apt to occur in the course of the anasarca of scarlet fever.

The *diagnosis* of acute hydrocephalus is, as might be supposed from the uncertainty of the symptoms, enveloped in much obscurity. I will merely quote the statement by M. Valleix, that if, in the course of a dangerous disease, and particularly in the anasarca which follows scarlet fever, severe cerebral symptoms without paralysis are observed to occur, we may suspect the existence of acute hydrocephalus; the presumption would be still stronger and would amount, indeed, almost to a certainty, were a more or less rapid loss of consciousness observed to follow the disappearance of a serous effusion situated in some part of the body distant from the head.

The *prognosis* is exceedingly unfavorable, as the disease rarely occurs except in the course of or at the termination of other affections which are themselves very dangerous to life.

TREATMENT.—The treatment of acute hydrocephalus is rendered very uncertain in consequence of the obscurity of the diagnosis. Bloodletting, however, has been employed in several cases, and apparently with good effects in some which occurred in the course of diseases of a manifestly dropsical character. Such was the case reported by Dr. M. Hall (*Dis. and Derange. Nerv. Syst.* p. 152), which occurred in a boy twelve years old, on the sixteenth day after the invasion of scarlet fever, and which came on simultaneously with œdema of the face, by a sudden attack of collapse, followed by convulsions and coma. Dr. Hall bled the child to the amount of twenty ounces from the jugular vein, when the convulsions ceased, but the coma did not disappear. He then took seven ounces more from the arm, and in less than an hour the child knew his parents. The case terminated favorably. A case is reported by M. Barrier (*Loc. cit.* t. ii, p. 359), from a memoir on acute hydrocephalus by M. Piet, of a girl nine years old, who, on the fifteenth day of a very mild attack of scarlet fever, took cold in the evening from exposure at an open window, and was attacked the next day with tonsillitis, œdema of the face, and then with amaurosis, complete immobility of the pupils, violent convulsions of the right side, palpitations, and stupor. She was treated by leeches to the head, tartar emetic, powdered digitalis, and diuretic infusions. After five days the œdema and nervous symptoms began to moderate, and in a short time she was restored to health.

M. Barrier relates another case published by M. Lecointe, of a boy thirteen years old, who, about two weeks after an attack of some eruptive disease, which was almost certainly scarlet fever, was seized with œdema of the feet, legs, scrotum, and abdomen, and with headache. After a short time he was attacked with violent epileptiform convulsions, intense headache, and soon after with loss of sight and hearing, and stupor. The convulsions were frequent, and while they lasted the face became purple, and the mouth filled with bloody spume; the contortions were terrible. On the first day the patient was freely leeched along the jugular veins, a camphorated blister was applied upon each thigh, and an emollient cataplasm upon the abdomen. He took internally a mucilaginous drink containing nitre, and ten drops of sulphuric ether in water every hour. On the second day the condition remained the same; pupils excessively dilated, pulse hard and accelerated: venesection to about sixteen ounces. An hour later, as the convulsions returned, about twelve ounces more of blood were taken in the same way. In the course of the day, the bandage around the arm got displaced; this was not discovered for several hours, so that a considerable hemorrhage took place, but the convulsions did not return afterwards. From that moment the patient recovered gradually under the use of sinapisms to the extremities, a potion composed of the tincture of castor and amber, and sulphuric ether, and a drink made of infusion of cherry-laurel and orange-flowers. On the third day he recovered his sight and entire consciousness, and on the eighth day was able to walk.

That bleeding does not always produce such good effects, however, is shown by the result of the following case, which occurred to myself. An unusually large and hearty girl, twelve years old, was seized with grave scarlet fever, of which she was extremely ill from the third to the ninth day. She then improved somewhat, but on the twelfth day was attacked with general anasarca, unaccompanied, however, with severe nervous symptoms, and which nearly disappeared on the sixteenth. From the twenty-first to the twenty-fifth day, she did very well. There was merely slight œdema of the face, and she sat up the greater part of the day in good spirits. At eight o'clock, on the evening of the twenty-fifth day, as she sat in an armchair, taking her tea, she said suddenly to her sister, "There is some one sitting on my arm," and her sister saw that on endeavoring to take hold of a teaspoon, the hand no longer obeyed the will. Her speech then became mumbling, and she fell back in a slight convulsion. I saw her within half an hour from the beginning of the attack, and found her unable to speak, almost insensible, and slightly convulsed. I bled her immediately to the amount of twenty ounces from the arm, applied cold to the head, gave a purgative enema, and ordered a cathartic dose of calomel and jalap. In a few moments after the bleeding she was attacked with terrific general convulsions. The bleeding was repeated in half an hour to the amount of at least sixteen ounces more, but without any effect. The convulsions continued with very slight intermissions for ten hours, when they ceased, and were followed by profound coma, and death in twenty-three hours from the onset of the nervous symptoms. No autopsy was made.

In another case, that occurred in my own practice, in a fine boy fifteen years of age, the same terrific convulsions made their appearance suddenly, and without any warning, at the end of the third week of a moderately severe attack of scarlet fever, and after the patient had exhibited very slight anasarcous symptoms for two days. He was bled largely at the arm, immediately without any good effect whatever. He was then cupped upon the back of the neck. A partial return of consciousness followed, but very soon the convulsions recurred, and, alternately with profound coma, continued until he died, at the end of twenty-four hours. These two unfortunate cases have greatly shaken my faith in such large depletion, and should I meet with another such case, instead of these large general detractions of blood, I propose to bleed more moderately, by cups over the region of the kidneys, and by cups or leeches upon the temples or back of the neck, while, at the same time, I shall administer internally an active cathartic, to be followed by free doses of diuretics, such as digitalis in combination with salines.

I have only to add, in regard to the treatment of acute hydrocephalus, the advice of M. Barrier, which is to employ, when the apoplectic nature of the disease, its coincidence with dropsical affections of other parts of the body, the state of the urine, and the antecedent history of the case, make the diagnosis clear, the treatment generally required by scarlatinous dropsy, that is to say, diaphoretics, diuretics, and hydragogue cathartics. He adds, that as experience has seemed to show that bloodletting is useful, though hydrocephalus is not probably an inflammatory disease at first, we should be blamable not to resort to it. For further information on this subject, the reader is referred to the article on scarlet fever.

ARTICLE IV.

CEREBRAL CONGESTION.

It appears, from the evidence of several of the highest authorities on the diseases of children, that cerebral congestion is of rare occurrence as an idiopathic and distinct affection in early life. To prove the truth of this statement I have only to quote the opinions of some of the writers referred to. MM. Rilliet and Barthez assert (1ère édit. t. i, p. 649) that they have found in children dying of different diseases, and who had presented no cerebral symptoms, congestion precisely similar to what they found in others, who had exhibited more or less dangerous idiopathic or secondary nervous symptoms. "Some patients," they remark (*Loc. cit.* p. 650), "it is true, who presented us with examples of cerebral hyperæmia, had had well-marked nervous symptoms. Thus we have met with the anatomical characters of congestion in young subjects who had perished with convulsions, in those whose sickness had been accompanied by violent delirium, and in others who, in the course of scarlet fever, for instance, had been seized with nervous symptoms. But, on the other hand, we have met with a nearly equal number of patients who had died under the same circumstances, but in whom the cineritious and medullary substances preserved their usual color, and the pia mater was not injected. What are we to conclude from these facts? Most assuredly that we ought not to attribute to cerebral hyperæmia any considerable part in the production of the symptoms." At page 651 they say: "The most important practical point is, in fact, to determine whether it is possible to recognize cerebral congestion in a child by special and characteristic symptoms, and whether we ought as a consequence to prescribe a particular form of treatment. We acknowledge, on our part, that we find it impossible to describe any symptoms peculiar to that condition, and consequently to formulate a treatment." In the article on convulsions (t. ii, p. 281) they state that in some of their patients they found no traces of congestion, and add that eclampsia is sometimes (a well-known fact) connected with an anæmic state of the brain. "What are we to conclude from these opposite facts, if it be not that congestion plays but a secondary part in convulsions?" They coincide in opinion with the authors of the *Compendium*, who suppose that the congestion found in patients who have died with convulsive symptoms, is generally the effect and not the cause of the convulsions. They do not deny, however, that a sudden congestion of the brain may produce a convulsive attack, and quote cases from other writers.

I believe it to be a very common opinion in this country that most of the nervous symptoms (delirium, somnolence, coma, convulsions, &c.), which occur in the course of many of the diseases of childhood, depend chiefly upon a congested condition of the nervous centres, and many practitioners refer most of the cases of eclampsia of children to the same cause. I am glad, therefore, to call the attention of the profession to this point, and to place before it the opinions of some of the recent distinguished authorities in regard to it.

The authors of the *Bibliothèque du Méd. Prat.* are of opinion that it is very rare to meet with true pathological and idiopathic congestion of the brain, either in the first or second infancy (t. vi, p. 118). M. Barrier states that primary or secondary hyperæmias are sometimes a cause of convulsions, and that such cases are the most dangerous of their kind. He also states that in rare instances congestion assumes a more menacing character, similar to that which is more frequently met with at an advanced age, meaning the apoplectic form. M. Valleix asserts (*Loc. cit.* t. ix, p. 259) that "cerebral congestion is a disease almost unknown in infancy."

M. Rilliet, in the paper on simple meningitis quoted in the article on that disease, states as his opinion that the cases attended with dangerous cerebral symptoms, which resemble exactly those occurring at the commencement of meningeal inflammation, which terminate rapidly in death or recovery, and in which the only lesions found after death are congestion of the brain and its membranes, ought to be regarded as dependent upon congestion, though he thinks it difficult to determine positively whether they are in fact the result of that condition, or whether they are not merely the forming stage of meningitis.

Dr. Chas. West, of London, whose recent publications upon the diseases of children are amongst the most valuable that the English press has afforded us, treats of congestion of the brain in children as a very important and frequent condition of disease. (*Lect. on the Dis. of Inf. and Childhood, London.*) I shall chiefly follow Dr. West in my remarks upon this subject, for though there can be no doubt, from the researches of the French observers above quoted, that its importance has been much exaggerated, and that its real influence in the production of the symptoms generally ascribed to it is very imperfectly understood, yet a considerable number of cases occur in practice, especially favorable ones, which it is very difficult to understand or to know how to treat except upon the time-honored supposition of congestion.

Dr. West treats of congestion of the brain under two heads, as *active* or *passive*. By the former is meant the kind of congestion occurring under the influence of a cause which greatly increases the flow of blood to the head, and to this class belong, for instance, the head symptoms which often usher in the eruptive fevers; by the latter is understood the kind depending on an impediment to the reflux of blood from the brain, to which belong, for example, the convulsions which occur in a fit of hooping-cough.

Active congestions may occur during the process of dentition, or may result from exposure to the sun, or from blows upon the head; passive congestion may be the result of a mechanical impediment to the return of blood from the brain, as the pressure of an enlarged thymus, or it may be the result of enlarged and tuberculous bronchial glands upon the jugular veins, or of languid circulation depending upon want of pure air, or of nourishing and sufficient food. Dr. West states that intense cerebral congestion is not a very unusual consequence of the disturbance of the circulation at the outset of the eruptive fevers. He says that convulsions and apoplectic symptoms sometimes come on suddenly in these cases, and may terminate fatally in less than twenty-four hours: after death "the brain is found loaded with blood, but all the other organs of the body are quite healthy." I would merely remark here, that it seems to me very doubtful whether the nervous symptoms just alluded to, ought not to be regarded as the result of the presence in the nervous centres of a diseased and vitiated blood, rather than of congestion. That congestion does not always produce them is shown by the statement of MM. Billiet and Barthez (*Loc. cit.* t. ii, p. 620), in regard to the cerebral symptoms of scarlet fever, "that a more or less marked sanguine congestion (of the cerebro-spinal apparatus) is the only alteration *generally but not always* found; and sometimes the congestion is not more marked than in other diseases in which there had been no cerebral symptoms." With these remarks I shall pass on to the consideration of the symptoms generally ascribed to congestion occurring under other circumstances, as those taking place in the course of the eruptive fevers will be treated of under the head of those affections.

Dr. West states that cerebral congestion may come on suddenly with very alarming symptoms, or it may be preceded for a few days by general uneasiness, by a disordered state of the bowels, generally but not always consisting of constipation, and by peevishness. "The head by degrees becomes hot, the child grows restless and fretful, and seems distressed by light, or noise, or sudden motion, and children who are old enough sometimes complain of their head." Vomiting generally occurs repeatedly, sometimes before any other symptoms, and is a very important sign. The fever varies greatly as to its violence, though the pulse is usually much and permanently quickened, and if the skull be still unossified, the anterior fontanelle is either tense and prominent, or the brain is felt and seen to pulsate forcibly through it. The sleep is disturbed, the child often waking with a start, and there is often occasional twitching of the muscles of the face or the tendons of the wrist.

The child, Dr. W. remarks, may recover from these symptoms without any medical interference, or the case may become aggravated and terminate in acute hydrocephalus; or again, the congestion may increase and cause the following symptoms. Under the latter condition, "the countenance becomes heavy and anxious, the indifference to surrounding objects increases, and the child lies in a state of torpor or drowsiness, from which, however, it can at first be roused to complete consciousness." The bowels generally continue constipated, and the vomiting seldom ceases, though it may be less frequent. The pulse is usually smaller than before, and often irregular in its frequency, though not intermittent. "An attack of convulsion sometimes marks the transition from the first to the second stage; or the child passes, without any apparent cause, from its previous torpor into a state of convulsion, which subsiding, leaves the torpor deeper than before. The fits return, and death may take place in one of them, or the torpor growing more profound after each convulsive seizure, the child at length dies comatose."

This second stage is usually of short duration, as death generally occurs, unless relief be afforded by appropriate treatment, within forty-eight hours from the first fit, "though no graver lesion may be discovered afterwards than a gorged state of the vessels of the brain and its membranes, and perhaps a little clear fluid in the ventricles and below the arachnoid." Occasionally, however, recovery takes place, contrary to all expectation, after these symptoms have continued but slightly modified, for days or even weeks.

Acute congestion is to be *treated* like simple meningitis, with blood-letting, cathartics, calomel, cold applications to the head, baths, revulsives, low diet, and confinement to a cool, dark chamber. It is useless to repeat here, what has already been said in our remarks upon the treatment of meningitis.

In passive congestion the treatment should consist, according to Dr. West, of careful local depletion, if the case will bear it, and in strict attention to the diet and state of the bowels. He recommends mercury and chalk, to correct the bowels when they are out of order. If the case be associated with diarrhœa and bad nutrition, he recommends that extract of bark, with a few drops of sal volatile, or of the compound tincture of bark, be given two or three times a day. Farinaceous food, he remarks, is not usually well digested when nutrition is much impaired, and he recommends milk and water, or milk and water with isinglass, or veal tea.

ARTICLE V.

CEREBRAL HEMORRHAGE.

I SHALL consider hemorrhage of the brain under two heads, that of the substance, and that of the membranes; the former is usually designated as cerebral, and the latter as meningeal apoplexy. Both these forms of hemorrhage are of rare occurrence in childhood compared with other diseases of the brain, and with their frequency during adult life and old age. Of the two kinds, that of the meninges is the most common. I desire to state, before beginning the consideration of this subject, that I do not expect to be able to give an accurate account of it, since this is impossible in the present state of knowledge in regard to the diseases of children. I shall endeavor, however, by careful examination of recent authorities, to present as faithful a picture as is possible under existing circumstances.

DEFINITION; FREQUENCY; FORMS.—By cerebral apoplexy or hemorrhage is understood an effusion of blood into the substance of the brain. By meningeal apoplexy or hemorrhage is understood an effusion of blood between the dura mater and cranium, into the cavity of the arachnoid membrane, beneath the arachnoid, or in the meshes of the pia mater. Cerebral hemorrhage is a very rare affection in childhood. This is proved to be the case by the facts that MM. Rilliet and Barthez met with only eight cases in their extensive experience, and that M. Barrier saw but one in 576 cases of disease of all kinds. Meningeal apoplexy is of more frequent occurrence, since MM. Rilliet and Barthez report eighteen cases. M. Barrier met with one case of this form in the five hundred and seventy-six cases referred to. Dr. West (*Lond. Med. Gaz.* June 18th, 1847, p. 1062) says he has only twice met with distinct extravasation of blood into the substance of the brain in children.

Hemorrhage into the substance of the brain occurs in two different forms: one in which the effused blood is contained in a cavity caused by a laceration of the tissue of the organ, and designated apoplexy in a cavity; and the other in which the blood is effused in a multitude of little points of different sizes, and designated capillary apoplexy.

In meningeal hemorrhage the blood may, as we have stated, be effused between the dura mater and the bone. This form, however, is very rare, so rare, indeed, that several writers deny its existence. It is proved, however, to have occurred, by a case reported by MM. Rilliet and Barthez, which is the only one they have met with. In by far the most common form of the disease, the blood escapes into the cavity of the arachnoid membrane. Of this form the authors just quoted report 17 cases, while, according to the authors of the *Bibliothèque du Méd. Prat.* (t. vi, p. 193), the effusion always occurs in this situation. That this is not invariably correct, however, is proved by the case of effusion exterior to the dura mater already referred to, and by the fact that it sometimes takes place beneath or in the meshes of the pia mater. The latter class of cases is very rare, however, in proportion to those in which the hemorrhage occurs within the cavity of the arachnoid. MM. Rilliet and Barthez did not themselves meet with a single instance of that kind, but they quote two from other writers; and M. Valleix refers to a memoir by M. Prus, in which others are given. It appears, therefore, that in the great majority of instances, the exhalation takes place within the cavity of the arachnoid membrane.

CAUSES.—The causes of cerebral hemorrhage are very obscure, so much so, indeed, that some writers have not attempted to ascertain them. They appear to be the same in both forms of the affection. Amongst the ascribed causes are the sudden disappearance of eruptions of the scalp, observed in two cases by MM. Rilliet and Barthez, in one of which this effect is stated to have been produced suddenly by medical treatment, while in the other it followed the application of poultices to a favous eruption upon the same part. The disease is stated by M. Legendre to have followed in one case a violent fit of anger. It is said also to have been produced by various causes which acted as impediments to the circulation. The obstacle may be situated within or exterior to the cranium. To the first class belong cases in which the sinuses and large venous trunks of the head have been found obstructed by coagula of blood, or by the pressure of tumors, generally of a tubercular nature; to the latter, those in which there is compression of the superior vena cava by enlarged and tubercular bronchial ganglions, or obstruction of the abdominal circulation by pressure of hypertrophied organs, and chiefly of the spleen or liver. Another cause is thought to be the existence of confirmed cachexia and general debility from any diseased condition whatever, in which the blood having become thin and lost its plasticity, escapes from the vessels with great facility. This last condition is one which almost always exists in connection with the causes cited as acting through the agency of obstruction to the circulation, and tends of course to augment their dangerous effects.

In some instances the hemorrhage occurs in the healthiest and most vigorous constitutions, and cannot be accounted for in any way.

It appears that meningeal apoplexy is most frequently met with in very young children, according to MM. Rilliet and Barthez, between the ages of one and two and a half years, whilst M. Legendre did not meet with a single case after three years of age in 248 autopsies. Cerebral and ventricular hemorrhage, on the contrary, are much more common after three years of age than before, which is just the reverse of the law in regard to meningeal effusion.

ANATOMICAL LESIONS.—The description of the lesions of hemorrhage into the substance of the brain need not detain us long, for they are much the same as those observed in the adult. When the blood is effused into cavities (apoplexy in cavities), the latter are usually small in size, seldom exceeding from one to two-thirds of an inch in diameter, though in rare cases they have been found much larger. The cavity is formed by a laceration of the substance of the brain, and it is filled with soft, dark coagula, or sometimes with fluid blood; the walls of the cavity consist sometimes of the substance of the brain, which may be of a rosy color and natural consistence, or yellowish and softened, while in other instances they are formed of more or less numerous points of capillary apoplexy. The capillary form of effusion occurs in the shape of a number of points, scarcely so large as the head of a small pin, and of a dark or brownish color, which contrasts strongly with that of the cerebral tissue. These points evidently consist of true coagula, which are sometimes surrounded by small yellowish areolæ. The substance of the brain around the effusion is either white, firm, and perfectly healthy, or softened, and of a whitish, reddish, or yellowish color. The capillary effusions are generally limited within a space of from a third of an inch to an inch and a half in size, but they have been found scattered over a large portion of the hemispheres.

Both forms of hemorrhage are much more common in the cerebrum than cerebellum, and occur more frequently on the left than right side. In addition to the sanguine effusion there is generally considerable congestion of the pia mater, of the venous sinuses, or of the substance of the brain itself.

In describing the lesions of meningeal apoplexy, I shall confine my remarks to the effusion which occurs into the cavity of the arachnoid, this being, as we have already remarked, by far the most frequent form of the disease.

The appearances presented by the cavity of the arachnoid into which the effusion has taken place vary greatly in different cases, according to the age of the child, the quantity of the exhalation, and the period of time which may have elapsed between the accident and the death of the patient. It is very uncommon to find pure, liquid blood, though this has been met with. In most instances, there is a bloody serum mixed with thin, reddish coagula, contained in a soft and very delicate membrane lining the internal surface of the arachnoid. Sometimes the effusion is thin, limpid, and more or less yellowish in color, while at other times it is thick and brownish, or chocolate-colored. In some rare cases it is perfectly transparent and colorless. The fluid, in whatever state it exists, appears to be the result of transformations undergone by the effused blood. The solid portion of the blood or clot is found either in the condition of more or less recent coagula, or changed into false membranes, which sometimes resemble very closely the arachnoid itself, and sometimes a true fibrous membrane. The coagula are found in the form of thin membranes, varying between one or two lines, and an inch and a half or two inches in size. They are thickest generally in the centre, where they measure between a fifth of a line and two lines, and are brownish or greeenish in color, and of variable consistence, according to their age. These coagula may exist upon any portion of the brain, but according to MM. Rilliet and Barthez are most frequently met with upon its convex surface.

The coagula just referred to undergo in some instances a curious change, of which I shall give a short description. In the course of time the fibrinous portions of the blood are deposited upon the internal surfaces of the cavity of the arachnoid, in the form of a new membrane. When death occurs soon after the onset of the attack, the parietal layer of the arachnoid is found to be completely lined with this membraniform production, whilst the visceral or cerebral layer is covered by it only in certain points. When the case has lasted a longer time, on the contrary, the visceral as well as parietal layer of the arachnoid may be covered with the new production, and when this happens there is formed a true sac or cyst, destitute of opening, which lines the whole interior of the arachnoid, and contains within its cavity bloody serum and coagula. At first this new membrane is reddish in color, elastic, and of a stronger texture than might be supposed from its apparent thinness and softness. Its thickness is generally about a tenth of a line. At a later period the walls of the cyst become so thin and transparent, that they have been mistaken for the arachnoid itself. They differ, however, from the latter, in being rather less transparent and thin, and particularly in the circumstance of presenting numerous arborizations. When death occurs at this stage, which M. Legendre (whose description I chiefly follow) calls the second period, or that of complete organization of the cyst, the external surface of the latter is found to adhere intimately to the parietal portion of the arachnoid membrane, by very delicate cellular tissue, though not with so much force but that it may be detached by traction. The internal portion of the new membrane, on the contrary, which is lubricated by the serosity of the arachnoid tissue, is very slightly adherent to the layer of that membrane covering the brain.

So long as the cyst formed by the new membrane, or as it is called by MM. Rilliet and Barthez, the *pseudo-arachnoid* membrane, contains an amount of fluid sufficient to keep its surfaces separated, its cavity is single. When, on the contrary, the walls of the cyst have come into contact, either because of the partial absorption of the contained fluid, or because the fluid has accumulated at the lowest points, or wherever there is the least resistance, the cavity becomes multilocular in consequence of the cohesion of its walls at certain points.

The size of the cyst varies exceedingly. Sometimes it covers the greater part of the convex surface of one hemisphere, sometimes the whole, while in other instances it extends to the base, forming in that case a nearly complete shell for the whole brain. The quantity of fluid varies in different cases. Sometimes it amounts only to a few large spoonfuls; in others to one or two, or eight or nine ounces: in one case observed by MM. Rilliet and Barthez there was upwards of a pint on each side, or more than a quart in all. In most instances the hemorrhage occurs into both halves of the arachnoid membrane, so that there is a cyst for each hemisphere. More rarely it occurs only on one side.

In the second stage, and when the effusion is very large, which rarely happens except in young children and prior to ossification of the fontanelles or sutures, the symptoms resemble those of chronic hydrocephalus. The vault of the cranium is enlarged by the unnatural prominence of the frontal and parietal bones; the sutures are more open than usual, and the anterior fontanelle is distended and protuberant. When the effusion occurs thus early in life, before complete ossification of the skull, the brain does not appear compressed or flattened, as it does when the disease occurs at a later period.

The visceral portion of the arachnoid is often thickened, opaque, and more resisting than natural. The pia mater is frequently infiltrated with a good deal of serosity, which sometimes has a gelatinous appearance.

When death has occurred in the first stage of the disease, the brain usually presents signs of hyperæmia. The veins on the surface of the hemispheres are enlarged, the cortical substance is of a bright rose-gray color, and the medullary portion is dotted over with drops of blood. Sometimes the cellular substance beneath the arachnoid is slightly infiltrated with serosity, at other times not. The ventricles contain a very small quantity of fluid.

It seems pretty clearly established that the effusion is the result of exhalations from the membrane, caused by frequently repeated determinations of blood to the head, independent of a rupture of vessels. In some rare instances, however, as in one witnessed by M. Legendre, the effusion is the result of rupture. In the case observed by him, death took place in twelve hours from the attack, and the left hemisphere was found covered with a layer of coagulated blood, which had escaped from a ruptured vein. (*Biblioth. du Méd. Prat.* t. vi, p. 192.)

SYMPTOMS; DURATION.—The symptoms of hemorrhage into the substance of the brain in the child are, as a general rule, extremely obscure and uncertain, though in some few cases that have been observed, they were as characteristic as those which occur in adults. In obscure cases the chief symptoms that have been noticed were restlessness, delirium, headache, violent fever, grinding of the teeth, and, after a time, complete abolition of the intelligence, fixity of the eyes, invariable dilatation of the pupils, stertorous respiration, and general insensibility. Of three cases reported by M. Valleix (*Clinique des Mal. des Enf.*) the nature of the disorder was easily diagnosticated in one by the existence of complete hemiplegia, while in the two others, the only marked symptom was entire immobility. The only certain symptoms of the disease, therefore, would be a sudden attack of hemiplegia, either as the primary symptom, or following coma or convulsions, and lasting for at least several days. An attack of general paralysis would not be by any means so certain, as this may exist in several other diseases of childhood.

In a case which came under my charge, I believe the attack to have been one of apoplexy of this kind. A girl, two years and a half old, apparently in the enjoyment of excellent health, was suddenly, and without ascertainable cause, attacked with violent general convulsions and entire insensibility, which lasted with very slight remissions of the convulsive movements, but without any return of consciousness, for twelve hours. At the end of that time the convulsions ceased entirely, and she very soon regained her consciousness, remaining merely peevish and languid. She was, however, completely hemiplegic on the left side, so that she could neither rise in bed, nor turn towards the right side. The paralysis diminished rapidly, but regularly, so that at the end of three days she could sit up in bed, and in a few weeks was perfectly well. This child remained well, with the exception of rather unusual excitability, and some peevishness of temper, for three years, when she died of scarlet fever. No autopsy could be made.

The obscurity which exists in these cases will be clearly understood by any one who will read two examples given by Dr. West (*Loc. cit.* p. 1062).

With a short quotation from the work of MM. Rilliet and Barthez, I shall pass on to the subject of meningeal apoplexy. These authors remark (t. ii, p. 54), in speaking of this affection, that "cerebral symptoms have been observed to exist, but of so unusual a character, and so different from what have been assigned by writers to apoplexy, that they could not lead to a diagnosis of the disease."

I shall describe the symptoms of the meningeal form of hemorrhage under two heads; first, as they present themselves in the acute, and, second, as they occur in the chronic, or second stage of the affection.

Unfortunately, the symptoms of the acute or first stage are not much more certain and distinct than those of cerebral hemorrhage. The disease may begin with fever, and some convulsive movements, or, as happened in a case reported by M. Valleix, with violent general convulsions. Vomiting sometimes occurs at the beginning, but is usually very slight. It is difficult to know whether headache exists or not at the early age at which this disease commonly occurs. The convulsive movements generally affect particularly the eyes, and are followed by some degree of strabismus. The appetite is lost from the first; the thirst is moderate; there is no constipation. Soon after the symptoms just described, appear permanent contractions of the hands and feet, which are followed by attacks of tonic or clonic convulsions, during which sensibility and intelligence are abolished. Between the attacks of convulsions there is somnolence, which, though slight at first, becomes more marked as the case goes on. The attacks of convulsion become more and more frequent as the case progresses, until at the last they are nearly constant. The tonic convulsions affect the limbs and trunk both, but particularly the former, whilst the clonic spasms occupy sometimes one side of the body, sometimes the upper extremity alone, and at other times the whole body, but even then are usually stronger on one side than on the other. Paralysis is rarely noticed in the disease; it occurred only in one out of nine cases observed by M. Legendre, and in one out of seventeen observed by MM. Rilliet and Barthez.

Dr. West remarks (p. 1061): "The absence of paralytic symptoms, however, is not the sole cause of the obscurity of these cases, but the indications of cerebral disturbance, by which they are attended, vary greatly in kind as in degree. The sudden occurrence of violent convulsions and their frequent return, alternating with spasmodic contraction of the fingers and toes in the intervals, appear to be the most frequent indications of the effusion of blood upon the surface of the brain. I need not say, however, that such symptoms, taken alone, would by no means justify you in inferring that its effusion had taken place." Dr. West adverts particularly to the fact that apoplexy in the child is especially apt to occur in those who are weakly and feeble, and gives to this form of the disease the appellation of the cachectic form of cerebral hemorrhage.

The chronic form presents most of the symptoms which exist in acquired chronic hydrocephalus from serous effusion into the ventricles. The cranium is very large in proportion to the face; the sutures are not ossified; there is strabismus, with dilatation of the pupils; the sense of sight is generally but not always retained; the face loses its expression; if the child was old enough at the moment of the attack to show signs of intelligence, the latter are found to diminish rather than increase, and sometimes they are lost entirely, as the size of the head augments; and the child is apt to utter loud cries, particularly during the night. The cutaneous sensibility is in general neither lost nor diminished. The power of motion usually remains, though it was entirely lost in one case. The appetite and thirst persist.

The *duration* of cerebral apoplexy is very irregular. In one case quoted by MM. Rilliet and Barthez, it was a quarter of an hour; in another an hour; in a third forty-eight days; and in one reported by M. Valleix, in a very young infant, recovery was nearly perfect in a little less than two months, when the child was seized with pneumonia and died.

The duration of meningeal apoplexy is also irregular. According to M. Legendre, all the recent cases seen by him in the Children's Hospital died in from eight to twelve days, apparently rather from intercurrent diseases than from the primary affection itself, whilst cases occurring in subjects placed in better hygienic conditions, and not attacked with intercurrent affections, passed into the second or hydrocephalic stage of the disease. The second stage lasted, according to the same author, in the four cases which he witnessed, from eight to thirty months, and then death was the result, not of cerebral symptoms, but of complications affecting the thoracic organs.

DIAGNOSIS.—The diagnosis of cerebral hemorrhage is, as I have already stated, very difficult, unless hemiplegia exist. When the case commences, as it often does, with convulsions, or with inflammatory symptoms, it is often impossible to distinguish it from acute or tubercular disease of the brain.

The diagnosis of meningeal hemorrhage is also very often extremely difficult. Not unfrequently it occurs in the course of other diseases, and is then entirely latent. In acute, primary cases, the most important and distinctive symptoms are the early age of the subjects, between one and three years generally; the violent fever from the commencement, marked by full, frequent, and *regular* pulse; the absence of constipation; the frequency of the convulsive attacks, and particularly the permanent contraction with rigidity of the feet and hands.

The diagnosis between the form of hydrocephalus which follows meningeal apoplexy, and ventricular serous hydrocephalus, is exceedingly obscure. The only circumstance which seems to have any real value is age. MM. Rilliet and Barthez state that they have never known a child of two years old, or younger, to die of ventricular serous hydrocephalus from tumors, whether tubercular or not, of the brain; in all such cases the effusion has been the result of a sanguine exhalation.

PROGNOSIS.—The prognosis of both forms of the disease is very grave. It is impossible, however, to ascertain the prognosis with any certainty, so long as the symptomatology of the two affections is so obscure as we have found it to be. That cerebral hemorrhage is susceptible of cure, however, is proved by the case reported by M. Valleix, already referred to, in which the child had nearly recovered, when it was seized with another disease which destroyed it. I have not been able to find any well-authenticated case of recovery from the meningeal form, though I cannot imagine why it may not be susceptible of cure, like any other sanguine effusion.

TREATMENT.—The treatment must depend on the diagnosis of the case. In a sudden and severe attack, occurring in a strong and hearty child, and in which the symptoms of sudden pressure on the brain are clearly marked or even highly probable, it should be the same as that employed in the apoplexy of the adult, that is to say, antiphlogistic. The child ought to be bled from the arm, ankle, or external jugular, as soon as possible after the invasion, and this can be done generally in private practice within an hour. I believe that general bleeding is a much more powerful remedy in itself than local depletion, and moreover, it has the immense advantage of being applicable instantly upon the arrival of the physician, who can perform, or ought to be able to perform, the operation of venesection himself, instead of sending to a greater or less distance for a bleeder, leecher, or cupper, to do what the interest of the patient requires to be done at once. When, however, it is impossible from any cause to employ venesection, we may substitute leeching or cupping. It is impossible to lay down positive rules as to the amount of blood to be taken, as this must depend on the age and strength of the child, and the impression made upon the symptoms by the detraction. In the case of the girl two years and a half old, already referred to, who was attacked suddenly while in good health with general convulsions and entire insensibility, I took three ounces from the ankles, and applied leeches twice, within twelve hours from the onset, taking about nine ounces of blood in all. At the end of twelve hours, and after the second leeching, she regained her consciousness perfectly, but was hemiplegic on the left side. She recovered.

As soon as bloodletting has been practised, or, if leeches are employed, while they are being used, cold applications should be made to the head, either by cloths, the ice bladder, or by pouring water from a height from a pitcher or kettle. At the same time, or as early as possible after the invasion, a dose of some purgative medicine must be given. The best is calomel, either alone or combined with jalap or rhubarb. If given alone, it ought to be followed in an hour or two by castor oil, infusion of senna and manna, salts, magnesia, or some active cathartic. When the symptoms are very urgent, it is well to open the bowels still more speedily by a purgative enema.

Counter-irritants are always useful adjuvants to the remedies already mentioned. They should consist at first of mustard plasters applied to the extremities, and shifted from place to place. When the symptoms do not yield after proper depletion and the use of sinapisms for some hours, it is well to apply blisters to the calves of the legs, and to the nape of the neck.

The diet must be very strict, and should consist only of barley or arrowroot water, for a few days.

It ought to be remarked, however, that bleeding is not always proper in cases supposed to depend either upon cerebral or meningeal apoplexy, for, as has already been stated, the effusion of blood occurs more frequently perhaps in feeble and weakly children, as a consequence of previous diseases which have exhausted the forces of the constitution and occasioned a state of diffluence and dyscrasia of the blood, than in those of robust and plethoric health. In the former class of cases, depletion would of course be altogether inadmissible. Such was the character of two cases of meningeal apoplexy in children of five weeks and three years old, reported (*Loc. cit.*) by Dr. West. Again, of eight cases of cerebral apoplexy observed by MM. Rilliet and Barthez, four coincided with more or less general tubercular disease. In such cases as these, we must depend upon local depletion to a very moderate extent, if at all, and upon the use of purgatives, cold applications, and counter-irritants.

For the paralysis which follows apoplexy in children, I believe that the most important, and indeed the only treatment necessary, is attention to the general health of the patient, in order to give to nature time and opportunity to effect the absorption of the clot which has been thrown out into the substance of the brain, or of the exhalation which has taken place into the cavity of the arachnoid membrane. When the disease assumes the chronic form, occasioning the kind of hydrocephalus we have described, there is little more to be done than to attend to the general health of the child, and to promote absorption of the fluid by the internal administration of diuretics, and the preparations of iodine. It has been proposed also to get rid of the fluid by tapping, as has been done in congenital hydrocephalus, and in some cases of acquired chronic hydrocephalus.

CHAPTER II.

NEUROSES, OR DISEASES OF THE NERVOUS SYSTEM, UNATTENDED WITH APPRECIABLE ANATOMICAL ALTERATIONS.

ARTICLE I.

GENERAL CONVULSIONS, OR ECLAMPSIA.

General Remarks.—The word convulsions is a generic term applied to different forms of spasmodic disease, very dissimilar from each other in many of their characters.

Writers make different classifications of convulsions according to their peculiar notions in regard to the nature and causes of these disorders. The best division is, it seems to me, that adopted by most French writers, who arrange them by their supposed causes, making three classes, *idiopathic* or *essential*, *sympathetic*, and *symptomatic* convulsions. The first two classes are unaccompanied by appreciable lesions of the nervous centres, while the third is called symptomatic, because it includes cases of convulsions which are the sign or symptom of an appreciable lesion of the cerebro-spinal axis, as for instance, those which occur in the course of meningitis, tubercular disease, hydrocephalus, apoplexy, etc. In idiopathic or essential convulsions, the cause of the attack acts directly upon the nervous centres, while in those to which the term sympathetic is applied, the cause lies in the influence or effect upon the brain or spinal marrow of disease of some other organ; to the latter class belong the convulsions which occur in the course of pneumonia, bronchitis, the eruptive fevers, etc.

I shall not pretend to give an accurate account of symptomatic convulsions in this article, as they have already been treated of under the head of the different organic diseases of the brain in the course of which they occur. I shall refer to them in the present article only so far as may be necessary to elucidate the pathology, diagnosis, prognosis, and treatment, of idiopathic and sympathetic convulsions.

There is a form of eclampsia occurring in children, which I shall describe separately, as it differs in many of its characters from ordinary convulsions. This is the disease known by the names of spasm of the glottis, thymic or Kopp's asthma, laryngismus stridulus, and eclampsia with suffocation.

Definition; Synonymes; Frequency.—By convulsions is meant a condition of disease in which the muscular or locomotive innervation is deranged and perverted, so that the movements become irregular and automatic, and are no longer controlled by the will.

The only synonymes which it is necessary to mention are *epilepsia pucrilis*, *insultus epilepticus*, and *eclampsia*. The latter term, eclampsia, is, I believe, preferable to any other, and I would gladly introduce it instead of convulsions, which is too general a term to express the form of disease under consideration.

The frequency of eclampsia is very great. During the five years from 1844 to 1848 inclusive, 1729 children under fifteen years of age, died in this city of convulsions; whilst, during the same time, 1611 died of infantile cholera, 1060 of marasmus, 1041 of dropsy of the brain, and 772 of pneumonia, showing that eclampsia was the cause of a larger number of deaths than any other of the diseases just mentioned. It must be recollected however, that a very large number of these cases ought, beyond doubt, to have been returned under other titles, as many of them must have been a mere result of organic disease of the cerebro-spinal axis, and of other acute local or general diseases.

Predisposing Causes.—Essential and sympathetic convulsions are much the most frequent before the age of seven years, which is the case also in regard to symptomatic convulsions, though the latter often occur after the age mentioned. Of 86 cases of convulsions that I have met with, in which the age was noted, 18 occurred in the first year, 24 in the second, 20 in the third and fourth, 21 between the fourth and ninth, and 3 between the ninth and thirteenth years of life. Dr. West (*Lond. Med. Gaz.* vol. iv, 1847, p. 884) states that according to the Fifth Report of the Registrar-General, the deaths from diseases of the nervous system in the metropolis, under one year of age, bore a proportion of 33 per cent. to the deaths from all causes; from the first to the third year, the proportion was 20·9 per cent.; from the third to the fifth year, it was 20 per cent.; whilst from the tenth to the fifteenth year, it was only 9·3 per cent. Again, to show the very great influence of age upon the predisposition to convulsions, Dr. West states, that within the first year, the deaths from convulsions constituted 74·2 per cent. of the total mortality from diseases of the nervous system; between the first and third years, the proportional mortality from convulsions to the total mortality from affections of the nervous system, was 27·1 per cent.; between the third and fifth, it was 18·1 per cent.; while between the tenth and fifteenth years, it had fallen to 2·7 per cent.

Dr. West ascribes the great frequency of convulsions in early life to the predominance of the spinal over the cerebral system, and to the imperfect development of the brain.

It is generally stated that convulsions are more common in girls than boys. MM. Rilliet and Barthez found this to be the case in their private practice, whilst in the hospital, sympathetic and symptomatic convulsions were most frequent in boys. According to my experience, they have been most frequent in boys, since of 87 cases that I have seen in which the sex was recorded, 46 occurred in boys and 41 in girls.

It has been generally supposed that a delicate and nervous constitution, is a powerful predisposing cause to convulsive attacks. This has been denied, however, by several recent writers, whose observation is very careful and accurate. I am disposed to believe that it is not so much a feeble or delicate constitution that predisposes to convulsions, as it is one characterized by a highly susceptible, irritable, and nervous temperament, which often exists, in my opinion, in connection with a healthy and vigorous physical organization. Of 91 children in whom I have seen convulsive attacks, these occurred more than once in 12. Of the 12, nine presented every appearance of strong and vigorous health, with the exception that when laboring under any kind of sickness, as dentition, indigestion, the fever accompanying simple angina, in two the invasion of measles, and in one that of erysipelas, they immediately became extremely restless and irritable, or heavy and drowsy, and at a very early period, and sometimes with very little warning, were seized with convulsions. Three of the 12 were delicate: one was puny and feeble until after the completion of the first dentition, when it grew strong and hearty; one had had an apoplectic attack when an infant, which had caused partial loss of power of one side; and the third was very weak at birth, then grew stronger, and died in its second year of hydrocephalus following scarlet fever. The number of convulsions varied in the different subjects. In 1 there were five different attacks, in another four, in 4 there were three, and in 5, two. In one the attacks were very numerous, recurring frequently, and from very slight causes. They all recovered but one, and are still living. Of the 11 now living at various ages, all but one are free from anything like epilepsy, and that one, though liable during three years, to attacks of an epileptiform character, became gradually less and less subject to the seizures, and has now been for several years perfectly well in all respects.

I have another patient, a boy, whose case is not included amongst the above, now five years old, who has had ten different attacks of convulsion. These attacks were all produced by some disturbance of his health. Several of them have occurred at the outset of a febrile reaction caused by a simple catarrh of the upper air-passages,—the convulsions ushering in the catarrh just as they sometimes do an attack of measles or scarlet fever. On other occasions, the seizure has evidently been the result of a febrile movement caused by indigestion or gastric irritation. After having had nine different attacks, he remained free from them for a whole year, and then had the tenth at the very beginning of a catarrh of the larynx, fauces, and nasal passages. This child has never as yet exhibited any symptom whatever of disease, either acute or chronic, of the cerebro-spinal axis, and as the convulsions have always been connected with a febrile movement, there is every reason to hope that they are not epileptic. Another patient, likewise not included amongst the above, a girl now five years old, has also had frequent attacks, but as they are of short duration, always coincident with the fever of catarrh, or digestive disorder, and on one occasion that of measles, and as between the seizures her health is excellent, there is but little reason to fear epilepsy.

It is generally believed that the predisposition to convulsions is sometimes hereditary. I have remarked in regard to this point, that several children in the same family sometimes suffer from the disease, and that the nervous temperament to which I alluded above, appeared in some instances to have been inherited by the child from its parents.

In one family that I attend, out of six children, all but one have had attacks of convulsions: one of these children had but one attack, and that was at the age of ten years, and was caused by a fit of indigestion occurring during convalescence from pneumonia. The other four children had each several attacks, occasioned always by the febrile movement resulting from some of the numerous disorders of infancy. In none of these has there been any reason to suppose that the attacks were settling into epilepsy.

The *exciting causes* of convulsions are exceedingly numerous and dissimilar. Amongst the causes of essential convulsions are cited vivid moral emotions, violent pain, high temperature, exposure with the head uncovered to the sun, and sudden exposure to cold. In many cases, however, the exciting cause cannot be detected. The exciting causes of sympathetic convulsions may be almost any of the diseases incident to childhood. Amongst them I will cite as the most frequent, hooping-cough, pneumonia, catarrh, scarlatina, measles, violent fever from any cause, dentition, and indigestion.

Of 91 cases of convulsions, of which I have preserved notes, I have regarded only 3 as essential, while 66 were sympathetic, and 22 symptomatic. Of the 3 essential cases, I could not detect the exciting cause in any. Of the 66 sympathetic cases, it was scarlet fever in 8; pertussis in 9; indigestion in 13; pneumonia in 8; the fever of simple angina in 6; cholera infantum and bronchitis, each 3; dysentery, 4; measles and dentition, each 6; enteritis, the fever and irritation caused by a burn upon the back, and the onset of erysipelas, each 1; an overdose of castor oil (℥vi) given to a young child with a slight cholera, 1; and lastly, fecal accumulations in the large intestine, 1.

SYMPTOMS.—*Prodromic Symptoms.*—It has been asserted by some writers that most attacks of convulsions in children are preceded by prodromic symptoms, which indicate to the experienced eye their approach. This does not agree exactly with my own experience, at least in regard to the essential and sympathetic forms, since of the cases of the former variety, well-marked prodromes did not occur in any, and of 64 cases of the latter, in which the early symptoms were noted, strongly-marked precursory phenomena occurred only in 8. I do not mean to say that there were no symptoms in the other 56 cases, which might have indicated to an experienced eye the probability of an approaching attack of convulsions, but merely that there were none that were strikingly characteristic, none which pointed out clearly and decisively that such a crisis was close at hand. In many of the 56, there were symptoms that might be regarded as indicating, with various degrees of probability, the approach of the convulsive seizure; but, inasmuch as they were such as constantly exist in children not predisposed by temperament or constitution to eclampsia, without the development of the disease, they scarcely deserve to be called precursory symptoms.

The precursory symptoms of idiopathic and sympathetic convulsions are, therefore, difficult to describe because of their variable and uncertain character. They consist in general, however, of whatever indicates a highly disordered condition of the nervous system. The most marked symptoms are unusual drowsiness, excessive irritability, a peculiar physiognomical expression, general tremors, and the drawing of the thumbs into the palms of the hands, or rigid flexion of the toes. The drowsiness which precedes an attack of eclampsia, is almost always accompanied with some restlessness. The sleep is light and easily disturbed; the child moves and turns, or starts and moans; often it seems to have frightful dreams, and will scream out or wake suddenly bewildered and terrified, and when roused is generally excedingly irritable, crying violently or fretting at the slightest contrariety, or without cause. The face, and particularly the eyes, often exhibit a peculiar expression altogether different from their usual appearance. The expression which has most struck me, and which I have seen on several occasions, is a fixed and staring look, lasting but for an instant, as though the child were looking intently at some object, while in fact it is gazing at vacancy; at the same time the expression is entirely without meaning. The child seems in fact, for a moment, to be in a state of extasis. In some instances a sardonic smile is seen to pass over the countenance just before the attack. The tremors or tremblings alluded to above, occur both in the sleeping and waking state, but particularly in the former. Flexion of the thumbs and toes has been noticed by different observers, but is, I believe, a sign rather of the approach of symptomatic, than of essential or sympathetic convulsions.

The precursory symptoms of symptomatic convulsions will depend on the nature of the disease in the course of which they occur. Not unfrequently the convulsions occur at the very outset of the disease of the brain or spinal marrow, when of course there will be no prodromic symptoms whatever. According to Dr. Marshall Hall (*Diseases of the Nervous System*, p. 149), the first and most frequent sign showing that the excito-motory system is becoming complicated in diseases of the brain is vomiting, after which come strabismus, a contracted state of the muscles of the thumbs or fingers, or some unequivocal spasmodic or convulsive affection of the respiratory muscles, or of the muscles of the limbs.

Symptoms of the Attack.—With or without the precursory symptoms just described, the convulsive movements generally begin in the eyes, which, for a moment are fixed and staring, and then drawn obliquely upwards under the upper lid, so that the white portions of the balls alone are visible for an instant between the partially open lids. During the attack the eyes are rarely fixed in one position, but are constantly agitated in various directions, from side to side, or upwards and downwards; very often there is the most violent strabismus; the eyelids are sometimes open, at others shut; the pupils may be contracted or dilated. The muscles of the face next enter into contraction, and occasion the most hideous contortions of the features. The mouth is distorted into various shapes, the lips are often covered with a whitish or sanguinolent froth, and the jaws tightly clinched together by tonic spasms, or agitated by convulsive movements, so as to produce grinding of the teeth. The trunk of the body generally becomes rigid and stiff from tonic contractions of its muscles, though it also is sometimes variously contorted by clonic convulsions. The head is usually strongly retracted upon the trunk, but in other instances is drawn to one side, or violently rotated. The muscles about the front of the neck enter into action, and alternately elevate and depress the larynx; the tongue, when it can be seen, is observed to be moved in different directions, and is sometimes caught between the teeth and severely bitten. The extremities, particularly the superior, are more violently convulsed than any other parts. The fingers are drawn into the palms of the hands, the forearms are flexed and extended upon the arms by short, rapid, and generally rhythmical movements, the hand is quickly pronated and supinated upon the arm, or finally the whole upper extremity is twisted and distorted into various positions, which it is impossible to describe. The inferior extremities undergo similar movements, but almost always in a less degree than the upper. The respiration during the attack is irregular, sometimes suspended by rigid spasm of the respiratory muscles, and sometimes accelerated. A spasmodic contraction of the larynx, producing noisy inspirations, has been noticed by several writers. We shall find when we come to consider the nature of this disease, that Dr. Hall is of opinion that a more or less complete closure of the larynx is the most important feature of the convulsive crisis. The face is often livid and deeply congested, especially when the respiration is embarrassed; the head is hot, whilst the extremities are cold; the pulse becomes large and full, or frequent and small, and sometimes cannot be counted in consequence of the contractions of the muscles of the forearm. The face is not always however congested. I have sometimes seen it perfectly white, while the convulsions were severe, and the child profoundly insensible. The action of the heart is tumultuous, and sometimes irregular or intermittent. When the attack is very violent, the urine and feces are occasionally discharged involuntarily, but these are rare symptoms. Deglutition is seldom impossible even in the severest fit. In severe, and especially in long-continued attacks, intellectual consciousness, and general and special sensibility, are all abolished. In milder cases, though consciousness is destroyed, some of the special senses still respond to irritants, whilst in still slighter cases, the intelligence also is more or less preserved.

Convulsions are not always as we have just described them, general. They may be circumscribed or partial, affecting one side of the body more than the other, or one side alone, or a single arm. Sometimes they implicate the eyes only. The inferior extremities are rarely affected alone. Of the partial convulsions the most frequent are those in which some parts of the face and upper extremities are attacked. In this form of the disease, the disorders of the circulation and respiration, the congested tint of the face, the froth upon the lips, and the derangements of intelligence and sensibility, are much less strongly marked than in general attacks.

The *duration* of an attack of eclampsia concerns both the length of the convulsive crisis, and the continuance of the disposition to renewals of the crisis. Both of these are very uncertain. I have known the atttack to last in all its violence eight hours and a half in one case, and twelve in another, and it is said to have lasted much longer in some instances. When the spasmodic movements continue during a long period, they are almost always interrupted by remissions. As a general rule, the duration is much shorter than the periods above mentioned,—from a few minutes to half an hour. When the attacks cease and recur as they often do several times a day, they leave the patient during the interval in a state of more or less perfect consciousness or somnolence, restlessness or delirium, or finally of coma. The period during which the disposition to recurrence continues, depends principally upon the cause of the convulsions. If this continue in action, they will be apt to return until it is removed.

Idiopathic and sympathetic convulsions generally consist of a single attack, though there are sometimes several, which occur at intervals of some hours, or of one or two days. Sympathetic convulsions usually occur either at the beginning or termination of the disease which they complicate, and much less frequently during its middle period. Of 42 cases of this form observed by myself, complicating measles, scarlet fever, erysipelas, pneumonia, bronchitis, cholera infantum, simple angina and dysentery, in which the period was carefully ascertained, they occurred at the invasion alone in 21, at the termination alone in 15, at the middle period alone in 3, and at the invasion and termination both in 3. It is curious to remark, that of the 21 cases that occurred only at the invasion of the disease, all but 3 recovered; that the 3 occurring in the middle period alone also recovered; that of the 3 occurring both at the invasion and termination, 2 died; and that all of those which occurred at the termination alone, proved fatal.

MM. Rilliet and Barthez state that half the cases of symptomatic convulsions observed by them, occurred at the commencement of the encephalic disease. This form seldom consists of a single crisis; the attacks on the contrary, are repeated from time to time. The authors just quoted state that whenever the convulsive attacks have recurred repeatedly within an interval of a few days, they have proved symptomatic of disease of the brain.

NATURE OF THE DISEASE.—It appears to me that the only plausible and satisfactory explanation of the pathology of convulsions in children, is that afforded us by the physiological doctrines in regard to the nervous system set forth by Dr. Marshall Hall in his writings. Dr. Hall says (*Diseases and Derangements of the Nervous System*, p. 145), "That the whole *class* of convulsive diseases consists of affections of the true spinal system, there is no longer any doubt. But these diseases do not all *originate* in this system." All convulsive disorders are, according to this doctrine, affections of the true spinal or excito-motory system. The causes of these disorders may be of incident origin, acting upon excitor nerves; of centric origin, seated in the brain or spinal marrow; or of reflex origin, acting upon reflex or motor nerves. They are called, therefore, according to their causes, central or centric, when they depend on disease of the nervous centres; centripetal when they are excited through excitor nerves; and centrifugal when they depend on disease of the motor nerves. Dr. Hall ascribes great importance to the condition of the glottis in convulsions. He says (p. 323), in speaking of epilepsy, "The second symptom is a forcible closure of the *larynx*, and *expiratory efforts*, which suffuse the countenance, and probably congest the brain with venous blood." At page 327, he says, "A spasmodic affection of the larynx has obviously much to do in this disease (epilepsy), as well as in the crowing inspiration or croup-like convulsion of infants; so much, indeed, that I doubt whether *convulsion* would occur without closure of this organ." In describing the croup-like convulsion or laryngismus stridulus (p. 180), he says: "I must repeat the observation that the respiration is actually arrested by the closure of the larynx; and there are forcible expiratory efforts only, or principally, in the actual convulsion."

In a recent publication Dr. Hall says: "Without closure of the larynx, extreme laryngismus, and the consequent congestion of the nervous centres, there could, I believe, be no convulsion! This closure of the larynx must be complete, in the affection under consideration (laryngismus stridulus), as in all others, before convulsions *can* take place." (*Braith. Ret. from Lancet*, June 12, 1847, p. 609.)

It is easy to comprehend the mode of production of sympathetic convulsions by reference to these doctrines. They evidently depend upon morbid impressions conveyed to the true spinal system through the excitor nerves having their origin in the diseased organs. Thus it is easy to understand why inflammation of the parenchyma of the lung in pneumonia, of the bronchial mucous membrane in bronchitis, of the mucous membrane of the bowel in entero-colitis or dysentery, or of the pharynx in angina; why the pressure of a tooth upon an inflamed gum during dentition, the presence of a foreign body, as newspaper (in one of my own cases), or crude food, in the stomach, or fecal, or lienteric accumulations in the intestine, should produce a degree of irritation in excitor nerves, sufficient, when transmitted to the spinal centre, to occasion the convulsions we have been considering.

It is more difficult to explain the mode in which continued fevers, measles, scarlatina, &c., give rise to convulsions. To me, however, their occurrence is explicable by the morbid effect produced upon the nervous centres by the blood, which is known to be more or less changed, in these affections, from its healthful condition, and also by the mere fact of the existence of fever; for I have met with a number of children in my own practice, who are almost certain to have a convulsive seizure, whenever the circulation becomes greatly excited in force and frequency by the existence of fever, no matter what be the cause of the fever.

The explanation of the production of idiopathic or essential convulsions is not always so easy, because we are sometimes unable to detect any cause, either centric, centripetal, or centrifugal, to account for the excitation of the spinal system. It seems probable, however, that they must depend, like those of the sympathetic form, upon some unhealthful, and therefore irritating condition, acting upon the excito-motory system of nerves. The cause may be so slight as to escape the notice of the physician, and yet sufficient to produce a convulsive crisis in a child predisposed to eclampsia. It may be an unnoticed dentition, some undigested food in contact with the stomach or intestines, or accumulations of unhealthy fecal substances, or of vitiated secretions, in the intestines. When convulsions have followed a vivid mental emotion, as passion or vexation, they are evidently a result of the influence of that condition upon the nervous centres. Acute pain, which is said to have occasioned essential eclampsia, as well as exposure to violent heat or severe cold, must produce their effects through their action upon incident excitor nerves.

All symptomatic convulsions belong, of course, to the class of centric diseases. These need no further remarks.

DIAGNOSIS.—There are two important points to be considered in treating of the diagnosis of eclampsia: the diseases with which it may be confounded, and the causes which may have produced the convulsions, or, in other words, their distinction into essential, sympathetic, and symptomatic.

The only disease with which eclampsia is likely to be confounded, is epilepsy; the mistake could only be made when the former is violent, and when it is accompanied and followed by unconsciousness. In epilepsy, however, the invasion is more sudden, the convulsions are accompanied with greater rigidity, there is always frothing at the mouth, the duration of the crisis is shorter, and it is generally followed by more marked stupor. If the convulsive attack have occurred under the influence of an appreciable cause, if the parents are not epileptic, and if the child is very impressionable, it is probably eclampsia. Again, the younger the patient, the more likely is the case to be one of eclampsia; whilst if the child is approaching towards puberty, if the attacks are frequently repeated, and yet not dependent on fever, and if they are followed by complete restorations to health in the interval, the disease is much more likely to be epilepsy.

The diagnosis of the form of the attack, whether idiopathic, sympathetic, or symptomatic, is exceedingly important, as upon this must depend in great measure the prognosis and treatment. It is often very difficult, and sometimes impossible, to determine at the moment to which class the convulsions belong. The most difficult points in the diagnosis are the following: first, when a child previously in good health, is suddenly seized with the disease, to determine whether it is essential; whether it is sympathetic and occasioned by disease which, up to this instant, has been latent, or by the invasion of some one of the acute local diseases, or of one of the continued fevers; or lastly, whether it is symptomatic, marking the invasion of a disease of the cerebro-spinal axis: second, when the convulsion occurs in the course of a disease not implicating the nervous centres, to determine whether it is merely sympathetic of that disease, or whether it is symptomatic of an intercurrent affection of the brain or spinal marrow.

It is impossible, for want of space, to treat of all these points in detail. The enumeration of them, however, will be useful in calling the attention of the reader to their importance.

An essential convulsion is only to be distinguished by careful study of the antecedent history and present condition of the patient. If, after a thorough examination of all the organs, no diseased point can be detected and if the child recover perfectly from the convulsion, we must conclude that the case has been an idiopathic one, in which the cause is beyond our reach. I am disposed to believe, however, as has already been stated, that in most such cases there has been a source of irritation in some of the organs of the body, which has acted as the excitant to the excito-motory system, and which, if we could but detect it, would warrant us in classing the case amongst sympathetic convulsions.

The sympathetic and symptomatic forms of eclampsia are to be diagnosticated by the same careful attention to the antecedent history and present condition of the child. If the latter is teething at the time of the fit, and there is no other cause to explain the attack, and should there be nothing in the consecutive symptoms to render such an explanation inadmissible, we may refer it to that condition. I may remark merely, that, as a general rule, eclampsia depending entirely upon the irritation of dentition, is seldom either violent or long-continued, and that the return to consciousness and health is speedy. The probable dependence of the attack upon indigestion is to be ascertained by the absence of other causes, and by our learning upon inquiry that the child had eaten of some indigestible substance within a few hours or a day or two before the attack. Its dependence on intestinal accumulations is to be arrived at by the same negative or exclusive method, and by learning that the patient is usually, or has been of late, of a constipated habit.

When the attack occurs in the course of some other disease, as pneumonia, catarrh, enteritis, pertussis, scarlatina, or measles, it is almost certainly sympathetic. It may possibly, however, be indicative of an intercurrent attack of cerebral disease. This can be determined only by attention to the consecutive phenomena. If the attack be short, and soon followed by complete restoration to consciousness, it is in all probability sympathetic. If, on the contrary, the convulsive crisis be long and severe, if the recovery from it be slow and imperfect, if it be followed by violent agitation, somnolence, or coma, or by some persistent lesion of motility, there is every reason to fear an attack of disease of the brain.

Sympathetic convulsions occurring at the invasion of different local or general diseases, are to be distinguished only by observation of the symptoms that follow the crisis, which will be those belonging to the particular malady whose approach has caused the attack of eclampsia.

Symptomatic eclampsia is characterized by various signs of encephalic disorder, which soon follow the convulsive attack. The most important of these are severe and continued headache; diminution or exaltation of general or special sensibility; dilatation or contraction of the pupils; irregular movements of the eyes; flexion or stiffness of some of the limbs, or of the fingers or thumbs; disordered intelligence; or the symptoms which have already been described in the articles upon the diseases of the brain.

Prognosis.—The prognosis of essential convulsions must depend on the nature of the cause, and the violence of the attack. When the cause has been slight, or one which soon ceases to act, or can be readily removed, the prognosis is much more favorable than under opposite conditions. If the convulsive crisis is short and of moderate severity, if the pulse and respiration are but slightly disturbed, if there be but little congestion of the face and no stertor, there is every reason to hope a successful issue in the case. Of the three cases of this class that I have seen, two recovered and one died.

Sympathetic is more dangerous than essential eclampsia, but much less so than symptomatic. The prognosis will depend chiefly on the nature of the disease which it complicates, and on the stage of that disease at which it occurs. Thus, in scarlatina, convulsions, especially when they occur in the first few days of the disease, are almost always fatal, in measles much less so, and in other diseases in various proportions. They are very apt to terminate unfavorably when they occur after the malady which they complicate has been in progress for several days. This is a remark made by various authors, and I have already stated that of 42 cases of this form in which I carefully ascertained the period of their occurrence, 21 appeared at the invasion, of which all but 3 ended favorably; 3 at the middle period, which all recovered; 3 both at the invasion and at a later period, 2 of which were fatal; and 15 after the cases had been progressing for a considerable time, all of which proved fatal. In addition to these important elements for making the prognosis, we must consider, also, the duration and degree of violence of the paroxysm, the state of the patient after the fit as to its cerebro-spinal functions, and lastly the age and constitution of the child.

The prognosis of symptomatic convulsions must depend very much upon that of the disease of which they are the symptom. It may be stated as a general rule, that, like those of the sympathetic class, they are less dangerous when they occur at the beginning than a later period of the disease. They are always, however, very dangerous. Of 22 cases that I have seen, 19 were fatal.

TREATMENT.—I shall confine my remarks upon the treatment of eclampsia to the essential and sympathetic forms of the disease, having already treated of that of the symptomatic form in the articles upon the cerebral diseases which give rise to them.

I think that the treatment of eclampsia in children may be simplified if we pay attention to two distinct conditions of disorder, which appear to exist in every case. These are the condition of morbid irritation or derangement of the excito-motory system of nerves, and the cause which occasions that derangement. The condition of irritation or disease of the true spinal system exists in all cases, and is always the same, differing only in degree and extent; whilst the morbid cause of that irritation differs in each case, being in one dentition, in another pain, in another constipation, in others pneumonia or indigestion, pleurisy, catarrh, or angina, scarlet fever, measles, fright, or other violent emotions. If this view of the subject be correct, it is clear that in treating a case of convulsions, we have to attend to the two morbid conditions referred to, and I shall be careful, therefore, in the course of my remarks, to treat of the remedies most proper for the removal of the cause, whatever it may be, which acts as the irritant to the spinal system; and of those calculated to subdue or allay the deranged condition of the spinal system and the effects of that derangement.

There are some general rules to be followed in the treatment of convulsions which apply to all cases, and of these I shall first speak. They are, to place the child in a large *well-ventilated* room, if such can be procured; if it have been seized in a little close room, where the atmosphere is dense and impure, removal to another room, or exposure to fresh air before an open window, has sometimes sufficed to terminate the crisis. At the same time the clothes of the child should be loosened, in order to prevent all constriction, and if necessary, taken off, to allow of a careful examination of the whole body. I believe it is a good rule always to place the child, no matter what be the cause of the convulsion, if it be a severe one, in a *warm bath* (96° or 97° F.). This has frequently proved an efficient remedy, according to my experience. It is easily procured in most cases, and I am quite confident that I have never known it do harm, though I have used it in almost every case. The patient should be kept in the bath some ten, fifteen, or twenty minutes, or until the convulsive movements cease; when taken out it is most convenient, and at the same time useful, to envelop it in a small, light blanket, or flannel, for a short time, before the clothes are readjusted.

If the convulsion occur in a strong and vigorous subject; if it be violent, and accompanied by a deep red, or yet more by a livid flush of the face, and distension of the veins of the head and neck; if it last more than a few minutes, or is repeated after short intervals of quiet, I would in all cases, without hesitation, recommend the use of *bloodletting*. The detraction of blood is called for, in my opinion, for the same reasons as in puerperal convulsions, and indeed in every violent convulsive attack,—to save the nervous centres from the effects of the paroxysm, which are in all severe cases, excessive congestion, and in some, fatal effusions. It is useful, moreover, by means of the sedative and relaxing influence which it exerts upon the whole economy, and particularly upon the sanguine and nervous apparatuses. I think, therefore, that we may lay it down as a rule to employ bloodletting in all instances, except those in which the convulsion depends upon an anæmic condition, and in which it is contraindicated by a naturally feeble or by a debilitated state of the constitution; those in which it is clearly unnecessary from the slight severity or short duration of the attack; or those which occur in the course of other diseases, and particularly at their termination, and in which a resort to it is rendered evidently improper by the circumstances of the concomitant affection. The quantity of blood to be taken, and the method, must depend on the circumstances of the case. It is best to bleed generally whenever it is possible, as this is much more speedily performed than local bleeding, and because the sedative and relaxing effects of the detraction upon the economy are more powerful.

The blood may be taken either from the arm, from the saphena vein at the ankle, or when absolutely necessary, from the jugular vein. We must be guided as to the quantity by the age and constitution of the patient, the violence and duration of the paroxysm, and the cause of the attack. In a strong, hearty child, two or three years of age, in whom the attack is violent, and produced by some cause not likely to continue long in action and thereby exhaust the strength, we may take from four to six ounces at the first bleeding, and should this fail to exert an influence upon the paroxysm, a rather smaller quantity may be taken in one or two hours afterwards. In younger children, and those who are somewhat feeble or delicate, the amount drawn ought to be less. When general bleeding cannot, from any cause, be employed, we may resort to cups and leeches to the temples or back of the neck, or, as advised by some of the French writers, to more distant parts.

I believe it is useful in all cases of essential and sympathetic convulsions, which resist the employment of a warm bath and bleeding, and also when bleeding cannot be or is not resorted to, to make use of an *emetic* of some kind. The act of vomiting alone is often sufficient to break up a paroxysm of convulsions which has resisted various other means. This I learned first from the advice of an old and experienced practitioner, who was in the habit of employing emetics in all cases of eclampsia of children, and I have since seen it tested on numerous occasions. Dr. Hall recommends the induction of vomiting in the treatment of the paroxysm of the croup-like convulsion or laryngismus stridulus, and as a means of prevention in epilepsy. In the former he employs irritation of the fauces by tickling with a feather; in the latter, ipecacuanha. He says that a new mode of action is induced in the true spinal system by the act of vomiting, so that the disposition to closure of the larynx, and expiratory efforts, is exchanged for sudden acts of inspiration. The emetic which I employ is ipecacuanha. It may be advantageously combined with tartar emetic in the case of a vigorous child, especially if no depletion have been used. The employment of emetics is, of course, particularly called for, whenever there is a suspicion of the presence of undigested food or of foreign bodies in the stomach.

In addition to warm baths, bleeding, and emetics, *cold applications* to the head will be found proper and useful in nearly all cases which are of any considerable violence. Their use would be improper, however, when the surface is pale, the features contracted, and the pulse small and feeble; but, whenever the skin, especially that of the head, is deeply colored and turgid, and the pulse full and strong, they ought to be employed from the beginning. While the child is in the bath, its head may be wrapped in a cloth wet with ice-water; or after it has been removed, cold water may be poured from pitchers or a tea-kettle upon the same part. If the latter is done, enough should be employed to prevent the sudden reaction which inevitably takes place when but a small quantity is used. During the after treatment of the case, the cold applications ought to be continued so long as the head remains unnaturally heated.

The administration of a *purgative* dose is proper and useful in most cases of convulsions; particularly when it is found upon inquiry that the child has been constipated prior to the attack; when it is suspected that the bowels may contain crude food or some foreign body; when it is desirable to produce an evacuant effect in a strong plethoric child, or a derivative action from the brain, and when the attack is attended with violent determination of blood towards that organ. The best purgative in severe cases occurring in hearty children is *calomel*. It is advantageous because of its easy administration, its speedy operation, and the powerful sedative influence which it exerts upon the whole economy. The dose should be from three to six grains, according to the age. It ought to be followed in one or two hours by some other cathartic, which may be either castor oil, rhubarb, jalap, or salts. The best of all is castor oil if it can be given. When the attack is slight or the patient weak and delicate, castor oil is particularly applicable, as it operates with so little irritation to the intestine, or we may employ a mixture of castor oil and spiced syrup of rhubarb. Whatever the remedy may be, it should be given only in such quantity as to produce complete evacuation of the bowels and a moderate derivation upon those organs, without the risk of occasioning a degree of irritation sufficient to increase the disturbance of the nervous system already existing.

In many, indeed, in most cases of eclampsia it will be found that purgative *enemata* are of great service. They may be administered immediately before or after the bath, and not unfrequently have the effect of stopping the paroxysm. They may consist of water holding in suspension or solution castile soap, common salt, molasses, castor oil, sweet oil, or spirits of turpentine. If the first fails to operate in ten or fifteen minutes, another or even a third ought to be given.

Revulsives are of the utmost importance in the treatment of convulsions. They should be employed from the very first, or immediately after the use of the bath. In slight attacks, they alone are often sufficient to suspend the paroxysm, or at least the fit often ceases under their use. Mustard is the most useful and convenient form of application in the great majority of cases. It may be used either in the form of sinapisms, which are to be shifted from place to place, or in that of the foot-bath. When sinapisms are used, they should always be covered with gauze or fine muslin, to avoid the danger of leaving any of the mustard upon the skin after they are taken off. I once saw very bad ulcerations upon the feet of a child from the neglect of this precaution. In the hurry and bustle of the moment, the feet were not washed when the plasters were removed, and the mustard that remained produced vesications which ulcerated. In obstinate attacks, the revulsives ought to be reapplied from time to time, taking care to shift their position in order to avoid vesication.

Antispasmodics are highly recommended by some writers upon the disease, and particularly by M. Brachet, who appears to have used with excellent effect the oxide of zinc in combination with extract of hyoscyamus. I have had but little experience in regard to their use, but confess myself indisposed to resort to them except after the employment of the means already detailed; during the intervals between the fits, when these occur from time to time; and as a means of prevention in children threatened with the disease. There can be no doubt, from the evidence adduced in regard to their effects, and from what I have myself seen of the influence exerted by valerian upon the convulsive phenomena of acute cerebral diseases, that they have a considerable power of allaying the disorder of the locomotive apparatus present in all convulsive affections. As a means of prevention, therefore, as adjuvants to other remedies, and in children of very nervous, irritable temperament, and delicate constitution, in whom it is improper to use the more powerful agents already detailed, I would advise a recourse to substances of this kind. The ones most highly recommended are valerian, oxide of zinc, assafœtida, and camphor. Of these, valerian or assafœtida are the ones I have usually employed. Valerian is best given in the form of the fluid extract, of which from ten to twenty drops may be administered in water, to a child two years old, every half hour or hour, until several doses have been exhibited, after which it ought to be suspended for a while or given in smaller quantity. Assafœtida is best given in the form of emulsion, half a teaspoonful being administered per orem, or one or two teaspoonfuls mixed with a little warm water may be thrown from time to time into the rectum. M. Brachet gave the oxide of zinc in combination with extract of hyoscyamus, to the amount of at least two grains of the former and four of the latter in twenty-four hours, divided into four, eight, or twelve doses. A dose was given every two or three hours, and when the symptoms were very violent, the first two or three were repeated at much shorter intervals. M. B. says, speaking of this remedy (*Traité Prat. des Convulsions dans l'Enfance*, Deux. édit. p. 402–3), "I always found it to produce quiet; but whilst the cause remained, the quiet was only momentary, and the remedy seemed to have produced no effect." . . . "This remedy does not destroy the cause (of the convulsion), but it allows time to treat it by calming the nervous erethism."

Opium is a remedy which requires much care and discrimination in its employment, but which, in certain conditions of the disease, is of the greatest service. It should not generally be given while there remains any evidences of considerable determination of blood to the brain, but when this condition does not exist, or after it has been removed by blood-letting and revulsives, opium proves very useful in allaying irritability and restlessness, which themselves seem to keep up a disposition to a return or continuance of the convulsive phenomena. Somnolence also, and still more, coma, likewise contraindicate the use of opium. Dr. Eberle thinks he has seen much advantage from frictions over the spinal region with a mixture of equal parts of oil of amber, laudanum, and spirits of camphor, particularly in very young infants.

I shall here conclude my remarks upon the general treatment of eclampsia, and proceed to make some observations on the conduct to be pursued under particular circumstances.

It is always highly important for the direction of the treatment, to discover the cause of the attack. This is sometimes very easy, while in other instances it is exceedingly difficult, and not unfrequently, impossible. If the attack occur in the course of some acute disease, as pneumonia, catarrh, angina, enteritis, or dysentery, or during the progress of one of the eruptive diseases, the diagnosis of the case is, as a general rule, very easy. If, on the contrary, it occurs at the commencement of one of these affections, the diagnosis will be much more difficult, unless indeed the symptoms of the concomitant disease have already declared themselves, or should do so very soon after the convulsion. The treatment in such cases should be that laid down in our general remarks, modified, however, by the requirements of the particular disease during the course of which the eclampsia occurs.

When the attack occurs suddenly in a child previously in good health, or who had been merely slightly ailing for a few hours, the detection of the cause is still more difficult. The most probable causes, under such circumstances are, however, dentition, indigestion, intestinal disorder, or the approach of an acute general or local disease. It is easy to determine by inquiry of the attendants, and by examination of the mouth, whether the child is teething or not. As a general rule, the convulsions which depend solely on the process of dentition, are slight, and last but a short time. In all the instances that I have seen, in which such was the only cause to be detected, the attack was of this nature. The treatment in such instances is to lance the gums, if they are swelled and inflamed over the advancing teeth; to use warm baths, and to administer purgative and then antispasmodic enemata. These simple means will seldom fail when eclampsia depends on the process of dentition alone. But when, on the contrary, there is present indigestion, intestinal accumulations, or enteritis, as often happens during dentition, the case becomes more serious, and requires in addition to the treatment above described, one directed to the particular coexisting morbid condition.

The existence of indigestion as the cause of the attack, can be discovered only by ascertaining with great care the diet of the child during the previous days. If it appear that something of an indigestible nature has been eaten within a short time, and if, at the same time, it be impossible to detect any more evident or probable cause for the attack, we should have a right to conclude that it depends upon indigestion. Under these circumstances the proper treatment is the immediate use of the warm bath, and the earliest possible administration of an emetic of ipecacuanha. The operation of the emetic may often be hastened by tickling the fauces with a quill. If the paroxysm be very severe and long-continued, bleeding ought to be resorted to.

The presence of intestinal accumulations as the cause of the paroxysms may be inferred, when it is found upon inquiry that the patient has been constipated for some days, or that the stools have been scanty and hard, or scanty and very offensive; when the abdomen is distended and hard, and the distension is ascertained by palpation and percussion, not to be merely tympany; and, lastly, when there is no more evident cause for the attack. In such a case the particular treatment is the use of purgatives and enemata, in addition to the other means detailed.

The dependency of the attack on the approach or commencement of some acute general or local disease, can be inferred only from a very careful examination of the antecedent and present phenomena of the case. One of these may be suspected as the cause when we can account for the occurrence of the convulsion on no more reasonable supposition; when neither dentition, indigestion, nor intestinal irritation exist. It is scarcely likely that a convulsion could be occasioned by any of the acute thoracic or abdominal affections, unless the disease had already gone far enough to allow a careful examination of the different rational and physical symptoms, to determine its existence. Perhaps the most difficult cases to diagnosticate, are those which occur at the beginning of the eruptive fevers. Even here, however, a careful search for the prodromic symptoms of the disease, a watchful observance of the condition of the patient in and after the paroxysm, will generally lead to a correct opinion within a few hours, or after a day, and sometimes at the moment of the attack. Of the eruptive diseases, scarlet fever is much the most apt to be accompanied by convulsions at the onset, and in that disease the remarkable rapidity and activity of the pulse, the state of the fauces, the coryza, heat of skin, and early appearance of the eruption, will generally enable us to understand the cause of the convulsion at a very early period.

The treatment of sympathetic eclampsia depending on acute thoracic or abdominal disease, should be that which is proper for the particular malady which they complicate, with the addition of warm baths, revulsives, antispasmodics, and, after depletion, of opium, in the form of Dover's powder combined with nitre. The management of the convulsions which complicate the eruptive fevers, will be specially treated of in the articles on those maladies.

ARTICLE II.

LARYNGISMUS STRIDULUS.

Definition; Synonymes; Frequency.—Laryngismus stridulus belongs to the class of neuroses. It is characterised by crowing inspirations, or by momentary suspensions of the act of respiration; these attacks occur suddenly, and at irregular intervals, are of short duration, cease suddenly, and are unaccompanied by cough, or other signs of irritation of the larynx. If the disease progress, it becomes associated with other convulsive symptoms, as strabismus, distortion of the face, carpo-pedal spasms, or general convulsions.

It is "the peculiar species of convulsion" of Dr. John Clarke; the inward fits of Underwood; the spasm of the larynx or glottis of Marsh; the laryngismus stridulus of Good; the croup-like convulsion of Dr. Marshall Hall; child-crowing; the spasme de la glotte of some of the French writers; the internal convulsion of MM. Trousseau and Pidoux, and of MM. Rilliet and Barthez in their last edition; and the thymic asthma of the Germans. It is not mentioned by Dewees. It is described by Eberle under the title of carpo-pedal spasms.

The frequency of the disease seems to vary in different countries. In France it would appear to be somewhat rare. MM. Rilliet and Barthez (2ème édit.) speak of having seen nine cases. At the time of publication of their first edition, they had met with only one case, and then stated that they were acquainted with only one other, published by M. Constant in the *Bulletin de Thérapeutique*. M. Blache (article *Névrose du Larynx, Dict. de Méd.* t. xvii, p. 590) adverts very cursorily to one case. M. Valleix (*Guide du Méd. Prat.* Art. Asthme Thymique) doubts its existence as a distinct disease. In Germany, on the contrary, it would seem to be a rather frequent disease. In England it cannot be very infrequent, since Merriman says it is by no means uncommon. Copland (*Stridulous Laryngic Suffocation in Children, Dict. of Pract. Med.*), speaks of numerous cases that he has seen, and states that he has had as many as three under treatment at the same time. Ley speaks of having met with considerably above twenty cases. Dr. Marshall Hall remarks that "within the short space of one month, I have seen five cases of croup-like convulsion." Dr. Charles West (2nd edit. p. 266) mentions thirty cases of which he has preserved some record.

I do not think it is a common disease in Philadelphia, though it is certainly not extremely rare, since I have seen four cases myself, and know of the occurrence of two other cases that proved fatal, and of two cases of recovery.

Predisposing Causes.—*Age.*—It is generally acknowledged that the disease occurs most frequently during the period of the first dentition, though it has been known to occur as late as six or seven years of age. Of 21 cases (17 from authors, and four by myself), in which the age is given, 9 were six months or less of age, 6 between six months and a year, 4 between one and two years of age, 1 of two, and 1 of four years of age; so that of the 20, fifteen were under one year. It is evident, therefore, so far as these cases go, that the majority occur within the first, and very few after the second year.

Of the 30 cases mentioned by Dr. West, 24 occurred in children between six months and two years of age. All the cases seen by MM. Rilliet and Barthez were in children under two years old. Those authors state that the seven subjects observed by M. Hérard were more than two years of age, and that two of them were between three and four years old. From the statements made by authors in general, it would seem to be most frequent between the ages of three weeks and eighteen months. It has been known, however, in one very rare instance, to occur as late as seven years of age.

Sex.—It is most frequent in the male sex. Of 50 cases (45 from authors, and 5 by myself), 39 occurred in boys, and 11 in girls. MM. Rilliet and Barthez state that of 16 cases observed by themselves and by M. Hérard, 12 occurred in boys, and 4 in girls; of 183 cases collected by M. Lorent, in which the sex was noted, 125 occurred in boys, and 58 in girls.

Constitution.—Authors who have written on the disease generally express the opinion that it is most frequent in children of nervous temperament, in those who are delicate and feeble, and especially in those of scrofulous constitution. It is nevertheless acknowledged that it sometimes occurs also in the most healthy and vigorous subjects. It not unfrequently attacks several children in a family. Ley quotes four instances from other writers, in which three children in each family had the disease, and in one all three died. He states that his own experience fully confirms this fact.

MM. Rilliet and Barthez (2ème édit. note, t. ii, p. 527) state that Davies and Henrich have met with four, and Torgord five children of the same family affected with the disease. They quote from Reid the curious fact that Powell saw one family of thirteen children, not one of which escaped the disease.

Amongst the causes of the disease, in addition to those already mentioned, must not be forgotten *dentition* and *improper food.* These two are, indeed, probably the most influential of all in the production of the complaint. The age at which it occurs most frequently, the last half of the first, and the first half of the second year, the very period during which the process of dentition is most active, would alone go far to show that this must constitute one of its most powerful predisposing, if not exciting, causes. The opinions of writers on this point are also conclusive as to the great influence of this vital process. Improper food, and especially early weaning, and the attempt to bring the child up on hand, is clearly a potent predisposing cause of the disease. This has been clearly shown in the cases that have come under my own observation, and especially in one in which contraction with rigidity followed the laryngismus symptoms. The details of this case will be found appended to the article on contracture. Dr. James Reid, in an excellent work on the disease (see *Brit. and For. Med.-Chirurg. Rev.* July, 1849, p. 163), gives the following conclusions as to its etiology: "1. That for the occurrence of this complaint, the cerebro-spinal system is required to be in a peculiarly excitable state, which then acts as a predisposing cause. The period of teething is the most likely to produce this condition. 2. That during this irritable state of the nervous centres, the two most frequent (and in the majority of instances the combined) causes are the improper description of food which is administered to the infant, and the impure and irritating atmosphere which it breathes."

NATURE AND EXCITING CAUSES; FORMS.—Much difference of opinion has prevailed in regard to the nature and exciting causes of laryngismus stridulus since the disease has attracted the particular notice of the profession. Kopp and other German authors ascribe it to compression of the respiratory organs by enlarged thymus gland, while others of that nation, and some of the English and French writers, class it amongst the neuroses. Dr. Hugh Ley supposed it to depend on compression of the par vagum nerves by enlarged cervical and bronchial glands. Dr. Marshall Hall considers it to be a disease of the reflex system of nerves. Amongst the French writers, MM. Rilliet and Barthez regard it as a neurosis; Valleix doubts the propriety of regarding it as a distinct disease; Blache (*Dict. de Méd.* t. xvii, p. 584), speaks of it as a neurosis of the larynx, which may be either symptomatic or idiopathic.

Before examining in detail the different opinions quoted above, which I propose doing, I will refer to the anatomical appearances of the malady, as observed by M. Hérard in several autopsies made by himself (*Bib. du Méd. Prat.* t. v, p. 319–320).

M. Hérard states that he found the mucous membrane of the air-passages, as a general rule, perfectly healthy, presenting neither redness, inflammatory swelling, œdema, nor accidental products of any kind. The lungs were of the natural color and density, and crepitant. They always presented one marked change from their natural condition, however, which was a very high degree of emphysema, more general and strongly marked than in any other disease. This alteration is believed to depend, as it does in hooping-cough, upon the impediment to respiration which exists during the disease. MM. Rilliet and Barthez state, however, that emphysema was not present in any of their autopsies.

The heart and great vessels of the thorax often, but not always, contained more blood than usual, as in asphyxia.

M. Hérard states that he has made very minute researches in regard to the condition of the nervous system, examining the brain and spinal marrow, the pneumogastric, recurrent, and diaphragmatic nerves, and those of the extremities even, to their terminations, without, however, finding important lesions in any case. He excepts only serous effusion in small quantity, and evidently consecutive, in the ventricles and particularly in the membranes of the brain, and slight venous congestion of the same kind. The tissues of the brain and spinal marrow retained their ordinary consistence, and presented neither redness nor softening. His researches in regard to the state of the thymus gland will be adverted to presently.

I will now examine as succinctly as possible, the different opinions which are advocated in regard to the causes of laryngismus stridulus. These may be classed, it seems to me, under four heads. 1. Enlargement of the thymus gland; 2. Enlargement of the cervical and bronchial glands; 3. Organic disease of the cerebro-spinal axis; 4. That which regards it as a simple neurosis, without appreciable anatomical alterations.

1. *Enlargement of the thymus gland.*—That the disease is often coincident with, if not dependent upon, this condition, is proved by the observations of Kopp, Hirsch, Haugsted, Kyll, and others. Hasse (*Pathol. Anat. Syden. Soc. Ed.* p. 384), says there can be little doubt that it sometimes depends upon this cause.

It appears to me that it has been clearly shown by M. Hérard (*Loc. cit.* p. 320, 321), that the disease is entirely independent of any alteration of the thymus. That observer found that, in six children between two and four years old, dying of the affection, the gland weighed between half a drachm and a drachm in five, and four drachms and two scruples in the sixth. These cases alone show that the size of the gland varies greatly in different subjects attacked with the disease. M. Hérard has examined the gland, with a view to the elucidation of this point, in sixty children dying with various diseases, between two and four years of age (the age of those who had died of the disease under consideration). In fifty he found that it presented the same arrangement, color, density and weight, as in those who had perished with laryngismus stridulus. All of these subjects exhibited the same aspect; they were pale, thin, and most of them exhausted by diarrhœa. In ten of the sixty, the gland was much more voluminous, weighing from two to two and a half or five drachms, and in one instance an ounce and a quarter. The ten subjects upon which these observations were made died of different diseases, croup, acute laryngitis, asthma, meningitis, and varioloid. All exhibited the appearances of strong and vigorous health: the one which presented the largest gland was very fat, and so robust that though only twenty-two months old, he looked to be three or four years. It results therefore from these researches, that the gland is liable to great variations of size, and that its size bears a very exact proportion to the force of the child, being small in those who are slightly developed, or emaciated by chronic disease, and voluminous in those who are vigorously constituted, or who have died of acute diseases.

That the disease does not depend, at least in all cases, on this cause, is shown also by Haugsted (*Arch. de Méd.* t. xxxiii, 1833, p. 111), who reports the case of a girl, seven years old, in whom the gland weighed five ounces, and measured four inches long, and one and a half in thickness, without its occasioning the least difficulty of breathing of any kind. That it occurs in children in whom the gland is very small, is shown also by Caspari and Pagenstecher (quoted by Hasse, *Loc. cit.*)

2. *Enlargement of the cervical and bronchial glands.*—This condition as a cause of the disease, so strongly advocated by Dr. Ley, and adopted upon his authority by Kyll and Hasse, would seem from certain facts and arguments to be of doubtful agency.

Thus, Mr. Wakely (quoted by Kerr) states that "he possesses more than one case of tubercular affection in children, where the pneumogastric nerve has been completely flattened by the pressure of tubercles, without giving rise to any remarkable disturbance of the function of respiration." Dr. Hall doubts the correctness of this explanation of the phenomena of the disease, and says that if the contiguity of enlarged glands with the pneumogastric nerve have any effect, it is by their action upon it as an incident excitor, and not as a motor or muscular nerve.

3. *Organic disease of the cerebro-spinal axis.*—That it may depend on this cause is proved by a case mentioned by Dr. Coley (*On Infants and Children, Bell's edition*, p. 226), who states that in a fatal instance which occurred in his own family, the only morbid appearance found on dissection was a large exostosis growing on the inner surface of the occiput, which compressed the cerebellum and produced chronic inflammation of the dura mater. No disease was discoverable either in the cervical or thoracic glands. Dr. Kyll (*Arch. Gén. de Méd.* t. xiv, 1837, p. 94) quotes a case from Dr. Corrigan, of Dublin, which had lasted three months, in spite of calomel, emetics, and antispasmodics. Attention was called by chance to the spinal column, when it was discovered that pressure over the third and fourth cervical vertebræ was very painful, and produced loud cries from the child. Two applications of four leeches, at an interval of two days, to that point, removed all the symptoms, and the child recovered perfectly.

Dr. M. Hall (*Diseases and Derangements of the Nervous System*, 1841, p. 99) states that the crowing inspiration may arise from affections of the centre of the excito-motory system. He quotes a case related to him by Mr. Evans of Hampstead, of spina bifida, in which "there was a croup-like convulsion whenever the little patient turned so as to press upon the tumor." He states, moreover, that he found induration of the medulla oblongata in one case of the disease.

4. *That it is a neurosis.*—This is the opinion, according to MM. Rilliet and Barthez, of Caspari, Pagenstecher, Roesch, and Hachman. It is that, also, of MM. Rilliet and Barthez, and, as we have already seen, of MM. Blache, Hérard, and Dr. M. Hall.

That the disease is, in fact, in the great majority of cases, a simple neurosis, is proved, I think, by the opinions just quoted, by the autopsies of M. Hérard (already referred to), and by a case published by M. Constant, and cited by M. Blache (*Loc. cit.* p. 584). This was the case of a boy twenty-one months old, who was taken to the Children's Hospital at Paris, with well-marked symptoms of laryngismus stridulus, and who died there some days afterwards of small-pox. At the autopsy the larynx and brain were found to be healthy. Merriman also relates two cases in which the children died in fits, both of which were examined by a skilful anatomist, but "not the slightest appearance of cerebral affection" could be discovered.

That it is not always, however, a neurosis, is also shown, by the cases quoted under the first head from Drs. Hall and Coley, and by those in which the disease is accompanied from the first by symptoms of inflammation or congestion of the brain.

It has now been shown that the causes of the disease are exceedingly variable and uncertain, and that any opinion which asserts its dependence on one invariable and constant cause is untenable. We must, therefore, seek some explanation which shall reconcile, as far as possible, the facts related above, and harmonize the various opinions expressed by the authors quoted.

It seems to me that the explanation given by Dr. Hall (*Loc. cit.*), is the only one which accounts satisfactorily for the phenomena of the disease, and reconciles the contradictory accounts of its nature and causes hitherto brought forward. Dr. Hall regards it as an affection of the excito-motory or true spinal system of nerves, producing in mild cases partial closure of the glottis, and difficult inspirations, while in more severe cases the spasmodic disposition extends to other parts of the body,—to the eye-balls, and to the flexors of the fingers and toes. In very violent attacks, the glottis is entirely shut, the respiration is for a time suspended, and from the consequent impediment to the circulation, the nervous centres are violently congested, and general convulsions not unfrequently produced.

The causes may be either centric, seated in the nervous centres, or centripetal, in the excitor or incident nerves. In the great majority of cases, the causes are centripetal, consisting of various morbid conditions situated at the peripheral extremities of the nerves, which become causes in consequence of the irritation they establish in the nerve-extremities: this irritation is transmitted to the spinal centre, and thence reflexed through the various efferent or motor nerves to the different portions of the muscular apparatus affected in the disease, the larynx, face, extremities, and lastly, in severe cases, the whole body. The principal causes of this class are dental irritation occurring during dentition; gastric irritation, arising from excessive or improper food; intestinal irritation from constipation, intestinal disorder or catharsis; and perhaps the pressure of enlarged cervical or bronchial glands.

The centric class of causes includes such as are seated in the nervous centres. These are much less common than the former class, and give rise to a vastly more dangerous and intractable form of the disease. They are different morbid conditions of the brain and spinal marrow, as inflammation, congestion, and effusion. That such causes sometimes produce the disease is shown by the case of exostosis already quoted from Coley, that of spinal irritation from Kyll, that of Dr. Hall, in which he found induration of the medulla oblongata, and the one of spina bifida reported to Dr. Hall by Mr. Evans. In the latter case the tumor was seated on the loins. Mr. E. proposed to treat it by compression, but on making the attempt, found that it was followed immediately "by the affection described by Dr. J. Clarke" (*Hall, Loc. cit.* p. 144). Other centric causes are passion, vexation, fright, contradiction, &c. &c.

This theory of the nature of the disease likewise accounts for the varying character of the convulsive symptoms. The laryngeal spasm, from which the disease derives its name, does not constitute the whole malady; it is only one of the symptoms, though the principal one, and that by which it is particularly characterised. The other convulsive phenomena, which generally occur only in severe attacks, or after the disease has continued for some time, are distortion of the face, strabismus, carpo-pedal spasms, and general convulsions. The hydrocephalic symptoms which occur towards the termination of some cases, and the serous effusion within the cranium found after death, are, it ought to be recollected, often the consequences of the congestion of the brain and asphyxia, which take place during the more or less complete closure of the larynx.

Before proceeding to the description of the symptoms, I wish to make a few remarks on the forms of the disease.

M. Hérard (*Loc. cit.*) makes three forms, one, in which the spasm affects chiefly the larynx, to which he applies the term *laryngeal*, another, in which the diaphragm is principally affected, which he calls *diaphragmatic*, and a third, which is a combination of the two just named.

I shall describe but one form, under the title of laryngismus stridulus, but after concluding the history of the symptoms of that affection, I propose to give a short account of another spasmodic disorder of the respiratory apparatus, popularly known in this country under the appellation of "holding-breath spells," and consisting of a sudden and total arrest for a few instants, of the act of respiration. This is thought by Hérard to depend upon total closure of the glottis, and by Dr. Ranking (*Rank. Abst. Med. Sc. July to January*, 1848, p. 165) to occur during expiration, and to depend on spasm of the diaphragm. The latter gentleman states that he has seen the attacks frequently in two of his own children. It seems to me most probable that it depends on sudden spasm of all the respiratory muscles, and not of the diaphragm alone. My reasons for thinking so are, that the attacks do, as Dr. Ranking remarks, occur during expiration; that they are unaccompanied by any sound, at the time; and that when the spasm is over, the child instantly makes a full inspiration, unattended with stridulous sound, and generally bursts into a loud fit of crying, which would scarcely be the case were there a disposition to spasm of the glottis.

SYMPTOMS; COURSE; DURATION.—Laryngismus stridulus begins suddenly with a paroxysm of difficult respiration. The larynx is contracted spasmodically, and the entrance of air into the lungs is either prevented or impeded. In most cases, the closure of the larynx is only partial, and the respiratory movement continues, but is accompanied by prolonged and difficult inspirations, which give rise to the crowing or stridulous sound, whence the disease derives its name. The crowing sound is generally heard several times in each paroxysm, owing to the repeated but only partially successful attempts at inspiration; while in very violent cases it occurs only at the beginning and end of the accession, the respiration being entirely suspended in the middle period. At the same time the child presents an appearance of great distress. The body is thrown forcibly backwards, the eyes are fixed and staring, the nostrils dilated, and the whole countenance indicative of great anxiety. If the paroxysm continues many seconds, the face becomes bluish, the extremities cold, and the fingers and toes contracted. After a few seconds, or a minute, or even longer, the spasm of the larynx ceases; a loud, full inspiration takes place; a fit of crying generally follows, and the child either very soon regains its usual spirits, or, if the paroxysm have been very severe, seems weak, languid, and drowsy, and returns more slowly to its ordinary condition. Between the paroxysms the child may seem perfectly well so far as concerns the character of the respiration, but it almost always exhibit the symptoms of some derangement of the general health, or, in other words, of the morbid condition which is the ultimate cause of the laryngeal spasm.

The paroxysms are most apt to occur during sleep, or as the child is waking. They occur spontaneously, and are brought on by fretting or crying, coughing, fright, contrarieties, deglutition, by the sudden application of cold, and other sudden impressions. At the commencement of the disease they recur at rare intervals, and often attract little notice, but, as the case progresses, they become more frequent, and may amount to twenty or thirty in the day, according to Kerr. They sometimes cease entirely for some weeks, or even months, and then recommence. In a case attended by myself (reported in the *Am. Jour. Med. Sci.* April, 1847, p. 287), the attacks lasted eighteen days, occurring sometimes two or three times in an hour, and sometimes much less frequently. The child then recovered entirely for a period of seven months, when the disease returned, and after continuing for five days, caused the death of the child in one of the paroxysms.

If the disease continues to progress, it almost always becomes associated with other spasmodic symptoms. The thumbs are drawn tightly into the palms of the hands, and the fingers clasped over them, which gives to the backs of the hands a swelled and tumid look. At the same time the toes are strongly flexed under the feet, and the insteps look swelled like the backs of the hands. Sometimes the hands are bent on the forearms, and the forearms on the arms. There is often distortion of the face. In severe cases, or when the disease has continued for a considerable period, epileptiform convulsions make their appearance, and generally prove fatal.

The disease is apyretic in a large majority of cases. When fever arises it almost always depends on the condition which has occasioned the disordered action of the excito-motory system, or on some accidental complication. The pulse during the paroxysm is small, corded, rapid, and sometimes imperceptible. In the intervals it is natural or nearly so.

Death may occur very early in the disease, or after some weeks, months, or according to Kyll, years. In a case communicated to me by Dr. Wm. Pepper of this city, death occurred in ten hours from the commencement. In one quoted by MM. Rilliet and Barthez, it took place at the end of three weeks, and in another, in twenty months.

The *duration* is very uncertain. It generally, however, lasts several months. In Dr. Pepper's case, the duration was but ten hours. In one of my own cases it lasted eighteen days, then ceased for seven months, returned, and proved fatal in five days. In another case, the attacks of spasms returned from time to time, during a period of three weeks. In another case, the notes of which were obligingly furnished me by my friend Dr. Benedict, and which I shall append to this article, it lasted, in connection with contracture, four months and a half, and was followed by perfect recovery.

Holding-breath Spells.—This form of disorder is mentioned, so far as I know, only by MM. Rilliet and Barthez (1ème édit. t. ii, p. 255, 256), by M. Hérard, and by Dr. Ranking. I have met with a considerable number of well-marked cases of the affection, and believe it to be of quite common occurrence. It seldom happens that the physician is consulted in regard to it, as those who have charge of children in whom it occurs, almost always ascribe it to temper, and think it of but little moment. It appears to be the result of a sudden spasm of all the respiratory muscles, so that the child ceases for the time to breathe, from which circumstance, no doubt, it has received its name of "holding-breath spell." There is no stridulous sound, nor hoarseness of the cry, nor indeed sound of any kind. The face is contracted and bluish, and the limbs violently agitated at first, and then stiff; after a few seconds, or perhaps a minute in severe cases, the spasm yields, and is followed either by loud crying, which lasts for a few moments, after which the child seems perfectly well, or else it is followed by excessive paleness, with languor or prostration, lasting half an hour or even longer. The attacks recur with variable frequency; there may be several in a day, or but one, or they may occur only at intervals of several days. The most frequent cause of the paroxysms is contradiction. They are determined also by fright, pain, and crying. They never occur spontaneously, and never during sleep, so far as I know. It is to be distinguished from laryngismus stridulus by the absence of the crowing sound, by its not occurring spontaneously or during sleep, and by the absence of carpo-pedal or other spasmodic symptoms. It is, I believe, a spasmodic affection of respiration, analogous to, though not exactly similar to laryngismus stridulus. I have never met with it except during the period of the first dentition, and always in children of nervous temperament. The cases that I have met with all recovered, and in one only did the life of the child seem to be at all endangered. In this instance the paroxysms had recurred very frequently for eleven months, and on two occasions were terminated by slight spasmodic movements of the limbs, lasting only for a few instants, and unaccompanied by insensibility or other dangerous symptoms. After these attacks the child was removed to the country, where he recovered perfectly.

DIAGNOSIS.—The only disease with which laryngismus stridulus is likely to be confounded is spasmodic laryngitis, or false croup. From this it may readily be distinguished by the absence of catarrhal symptoms, or fever; by the fact that the paroxysms occur indifferently in the day or night, and that they are much more frequent; by the absence of cough or hoarseness of the voice, even during the height of the paroxysm; by the occurrence of tonic muscular spasms, and convulsions: and finally by the chronic course of the malady: the converse of all of which symptoms exists in spasmodic croup.

PROGNOSIS.—The prognosis of the disease is always serious, since even the mildest cases may terminate fatally in any one of the paroxysms. It is, however, far from being so dangerous a disease as has been supposed by some writers, and amongst others M. Valleix, who states that it is almost always fatal. (*Guide du Méd. Prat.* t. i, p. 564.) Of 56 cases collected from Pagenstecher, Hachman, Ley, Kopp, Hall, Constant, Rilliet and Barthez, Kyll, and 5 from my own observation, making 61 in all, 4 died of intercurrent or consecutive diseases, while of the remaining 57, 32 were cured, and 25, or about 43 per cent., died of the malady itself.

MM. Rilliet and Barthez quote from M. Lorent, the translator of Dr. Reid's work, the statement, that of 289 cases collected from various writers, 115, or rather more than 39 per cent., proved fatal.

The prognosis given by the physician ought to depend in great measure upon the cause of the malady. When it depends on dentition, improper diet, or gastro-intestinal disease, the case will in all probability terminate favorably if the proper treatment can be, and is, brought to bear, against those morbid conditions; while if it occur under the influence of a centric cause, or of enlargement of the cervical or bronchial ganglions, the prognosis becomes much more unpromising.

Treatment.—If the views taken of the nature of the disease in the above remarks be correct, it must be evident that for the treatment to offer any considerable chance of success, it must be directed not merely to the removal of the spasm of the larynx, which is only a symptom and not the whole disease, but to the remedying of the deeper-seated cause of the disordered functional action of the excito-motory system of nerves.

When dentition is ascertained to be the cause of the disease, the gums ought to be carefully watched, and freely scarified, so soon as there is the least heat or swelling over the advancing teeth. Dr. Marshall Hall deems the use of the gum-lancet one of the most important means of treatment we are possessed of, and recommends that the gums should be fully divided, "not once, or occasionally, but *twice*, or even *thrice*, daily." In another place, he says: "We should lance the gums *freely* and *deeply*, over a great part of their extent, *daily*, or *even twice a day*, and apply a sponge with warm water, so as to encourage the flow of blood." He even recommends that in very urgent cases, the *lateral* as well as the more prominent portions of the gum, should be scarified. Lancing of the gums is undoubtedly a most important point in the treatment of this and other diseases of childhood, connected with dentition. I have long been convinced, however, from personal observation, that a resort to this operation merely because the child is passing through the period of dentition, is at least useless. I have never found it to do any good, unless the teeth are near enough to the surface to produce manifest swelling, attended with heat and soreness of the gums. So long as the gum is hard, insensible, not turgid, and of its natural color, and the mouth not hot, cutting has done no good.

When the disease depends on gastric irritation, the result of an unhealthy milk, or of artificial diet, our attention must be directed principally to the removal of that condition. A wet-nurse ought to be procured at once if one can be obtained, and if the child will nurse. If this cannot be done the diet must be carefully regulated by the physician. Ass's milk or goat's milk ought to be used if they can be procured; if not, I would recommend the gelatine diet prepared as recommended at page 267. The proportion of the ingredients must be regulated by the condition of the stomach. If the digestive power be very weak, the proportion of milk must be only a fourth or even a sixth for a few days, while the amount of cream must bear its usual ratio to the milk.

When the child is thin and pale, and the stomach evidently weak and dyspeptic, it is well to resort to small quantities of stimulants, and to tonics in proper doses. The best stimulant is fine old brandy, of which from ten to twenty drops may be given three or four times a day, or every two or three hours. Or we may administer the aromatic spirits of hartshorn in connection with, or without the brandy: of this about ten or fifteen drops should be given four or five times a day, or alternately with the brandy. Of tonics, the most suitable, it seems to me, are quinine, in the dose of a quarter of a grain three or four times a day, or the citrate of iron and quinine, in the dose of half a grain, given in the same way. Another very excellent stimulant and tonic is the Huxham's tincture of bark, of which about five drops may be prescribed in the place of brandy. This kind of treatment will scarcely fail to stimulate the digestive power of the stomach to greater activity after a few days, and of course to improve the nutritive functions and the strength of the patient.

When the disease appears to depend on intestinal irritation, we must inquire carefully into its nature and causes. It may be connected with constipation, diarrhœa, or with an unhealthy state of the contents of the bowels. It is often dependent on the presence of crude or imperfectly digested food in the alimentary canal, and when this is the case, the only proper method of treatment is to attend to the state of the digestive function, and to discover and employ a proper diet. The bowels are quite frequently very torpid, and the stools, when obtained by medicine, are often found to be very offensive, light-colored, and pasty, conditions generally resulting from imperfect action of the liver. Under these circumstances small doses of mercurials, or taraxacum, should be resorted to in combination with or followed by mild aperients, as castor oil or rhubarb. One of the very best cathartic remedies, when this combination of symptoms is present, is Chaussier's mixture of castor oil and aromatic syrup of rhubarb, consisting of three parts of the former rubbed up with five parts of the latter. The dose is a teaspoonful every two or three hours, until the bowels are well evacuated. It is gentle in its action, and yet very efficient, gives no pain, and is easily taken. If a mercurial be desired, about two or three grains of blue mass, one or two grains of calomel, or four grains of the mercury with chalk, may be incorporated into an ounce of the mixture. When diarrhœa is present, it must be treated according to its causes, as recommended in the articles on simple diarrhœa and entero-colitis. When, on the contrary, constipation appears to be the cause of the disorder, this is to be treated by regulation of the diet, by the daily use of warm water enemata (particularly recommended by Dr. M. Hall), or, if these do not answer, by the exhibition of small doses of the mildest aperients.

Dr. Hall states that by strict attention to the dentition-process, and to gastric and intestinal irritation in the *dawn* of the disease, he has succeeded in curing all the cases he has seen but one, and in that he found induration of the medulla oblongata.

By those who suppose the disease to depend on enlargement of the thymic, cervical, or bronchial glands, it has been proposed to endeavor to procure a reduction of the hypertrophy of those glands by frequent applications of leeches, by the use of exutories upon the thorax, by the employment of strong purgative medicines, and by the administration of mercury, digitalis, and iodine. In a case apparently connected with enlargement of the bronchial or cervical glands, I should prefer to direct my treatment to the invigoration of the general health by attention to diet, by the use of tonics, and by proper exposure to fresh air, whilst I should employ internally, cod-liver oil, iron, iodide of potassium, the preparations of iodine, and antispasmodics.

When the disease depends on a centric cause, this must be treated, if it can be detected, according to its nature.

Antispasmodics.—Whatever be the causes of laryngismus stridulus, it is undoubtedly proper, whilst our chief efforts are directed towards their removal or mitigation, to make use of antispasmodics in order to moderate the spasmodic symptoms which are but the expression of those causes. The remedies of this class most highly recommended are cherry-laurel water, valerian, musk, assafœtida, oxide of zinc, and small doses of ipecacuanha. The most efficient are probably the oxide of zinc, which is recommended by M. Brachet (*Traité Pratique des Convulsions dans l'Enfance*) as one of the best antispasmodics that can be used in the convulsions of children, the fluid extract of valerian, and aromatic spirits of hartshorn. M. Brachet always combines the oxide of zinc with extract of hyoscyamus, and gives at least two grains of the former with four of the latter, in divided doses, in the twenty-four hours. He states that he has never given more than ten grains of each in the period mentioned. Of the fluid extract of valerian, about a teaspoonful, or even more, might be given in the twenty-four hours, to a child one or two years old. It should be mixed with water, of course. The aromatic spirits of hartshorn may be given as recommended above.

It must never be forgotten, however, that remedies of this class are to be employed only as palliatives and adjuvants, and not as curative agents.

Iron.—Of all the remedies to be employed, after attending in the strictest manner to the removal of the exciting causes of the disease, there is none of such almost universal applicability as iron, or its preparations. The patient is almost invariably, owing to the faulty state of the digestive and nutritive functions, more or less anemical, a condition imperatively demanding iron, and as this remedy rarely conflicts with the other means indicated, it should be given probably in all, or nearly all the cases. The metallic iron in powder, or in lozenges, in doses of half a grain or a grain three times a day, or the iodide of iron, in doses of from two to four drops, three times a day, in a mixture of syrup and cinnamon-water, are the best preparations, and they should be continued as a general rule throughout the treatment of the case.

Treatment during the paroxysm.—When the child is attacked with a paroxysm of difficult breathing, it should be lifted at once into a sitting posture, if it be reclining, and fanned, or carried to an open window, if the weather be not too cold. At the same time, cold water should be sprinkled upon the face, and if the attack be violent, we may resort to what is recommended by Dr. Hugh Ley and Dr. Hall, tickling of the fauces to produce nausea, or vomiting, or irritation of the nostrils with a feather, so as to occasion gasping respiration. In a case which occurred to my father, Dr. C. D. Meigs, accompanied with severe general convulsions, he found that the suspension of the respiration could very generally be broken in upon, and the paroxysm sometimes averted, by the application of a piece of ice wrapped in a cloth, to the epigastrium and lower part of the sternum.

To prevent congestion of the brain and effusion, which sometimes takes place as the effects of the attacks, Dr. Hall recommends a few leeches or cups to the head, the application of an alcoholic lotion over the whole head, or the use of the ice-cap. At the same time the bowels ought to be speedily moved by large enemata, either of simple water, or of water containing salt.

Removal to the Country.—When the disease persists, in spite of the means above recommended, and especially when it depends on dentition or digestive irritation, change of air will often produce a wonderful effect, and should always be tried. The good effects of removal from the city to the country are strikingly shown in the case communicated to me by Dr. Benedict.

CASE COMMUNICATED BY DR. PEPPER.

"A boy aged four months, remarkably healthy and well-developed, after suffering a few days with slight catarrhal symptoms, was suddenly seized with a peculiar stridulous crowing respiration.

"I saw the child about half an hour from the commencement of the attack, and found it with a pulse of 140, pale face, and livid lips. The pupils were contracted and the hands firmly clinched; the crowing sound was very loud, and attended every act of inspiration. At times the respiration and circulation would be entirely suspended for many seconds, followed by great lividity of the surface and coldness of the extremities.

"Eight or ten leeches were applied behind the ears, the feet placed in warm water, and a dose of Ol. ricin. administered, to be followed by saline enemata.

"Four hours from the commencement of the attack, all the symptoms were greatly aggravated; the wrists and fingers were firmly flexed, these spasms coinciding with the arrest of the circulation and respiration; there was now perfect insensibility. The child was placed in a warm bath, cold was applied to the head, and a sinapism along the spine, without, however, affording any relief to the crowing inspiration, or other spasmodic symptoms.

"At the suggestion of Dr. C. D. Meigs, the child was now placed on its right side, with the shoulders elevated; this position to be maintained at least six hours. At the end of that time the child was in no respect improved, and accordingly, at the suggestion of Dr. M., six leeches were applied over the cardiac region; ℥i of lac assafœtid. was thrown into the rectum, and a blister applied to the back of the neck.

"The child expired at midnight, about ten hours from the commencement of the attack, the crowing respiration, with more or less asphyxia, having persisted throughout.

"*Autopsy thirty-six hours after Death.*—Mucous membrane of larynx injected, but in other respects natural. Thymus gland 3½ inches long, 2½ wide, and at its upper part ¾ of an inch thick. Weight, 620 grains, or ten drachms and one scruple. Lower lobes of both lungs greatly congested. Heart natural. The brain *unfortunately* could not be examined."

Remarks.—It appears to me altogether probable, that the above case was one of those in which the paroxysms of dyspnœa, obstructed circulation, and laryngismus, were the result of pressure on the trachea, and of spasm of the glottis, caused by a greatly enlarged thymus gland. It was, in fact, a case of true thymic asthma, accompanied with laryngismus. A case of the same kind, though much less violent in degree, will be found in the last edition of MM. Rilliet and Barthez (note, t. ii, p. 518 *et seq.*). The patient recovered. The case is so exquisitely recorded, analyzed, and commented upon, and the treatment pursued was so sensible, philosophical, and moreover successful, that it well deserves and well repays an attentive perusal.

CASE COMMUNICATED BY DR. BENEDICT.

"The subject of this case was a boy born in July, 1845. He was a large, hearty child, and remained well until January, 1846, when his mother's milk failed, and he was placed upon artificial diet. From this time to May following, his diet was cream and water, barley-water, oat-meal, arrow-root, pounded crackers boiled with water, and gum water, all of which were tried in turn, being prepared and administered with the greatest caution as to time and quantity. A wet-nurse was tried, but the child refused the breast entirely.

"On the 27th January, he was attacked with diarrhœa, which lasted one week. This was followed by constipation, the stools being white, firm, tenacious, and offensive. The constipation continued up to July, when it was replaced by diarrhœa.

"February 4th, 1846.—On this day, the child being seven months old, was first observed a spasm of the larynx, producing a shrill, croupal whistle, or *ooh, ooh,* during two or three successive respirations, and followed by a cessation of breathing for some seconds, long enough to dash water in his face, carry him to the window, pat him on the back, &c. These spells occurred during the sleeping and waking state, and especially during crying or laughing, and continued almost daily and often many times a day and night until June, when he was taken into the country.

"Simultaneously with the laryngeal spasm, appeared contractions of the upper extremities, the thumbs being drawn tightly into the palms of the hands, the fingers flexed over the thumbs, and the hands bent on the forearms. The backs of the hands were swollen, and the skin looked tight and polished.

"For a few days in the middle of February there was a subsidence of all the symptoms, with decided improvement in every respect.

"On the 25th of the same month, occurred a return of all the symptoms, with extension of the spasm to the feet, the toes being bent under the feet, the insteps much swelled and having a polished appearance. At the same time there were occasional spasmodic movements of the muscles of the face, arms, and body, resembling those of chorea. This condition continued with occasional relaxations up to the 11th of June.

"The stomach was exceedingly delicate, rejecting the most carefully selected nourishment, and at times refusing all food. The child became pale, thin, and timid, was disturbed by the slightest noise, and shunned the light as painful.

"He was removed to the country on the 11th of June. There his health was gradually restored. The appetite improved, the spasm of the larynx and contractions of the extremities gradually relaxed, and the thumbs were at last liberated, the skin under them having taken on the appearance of mucous membrane. There was no return of the disease after the middle of June, although the child had a severe attack of diarrhœa in July, after which he got perfectly well, and has remained so up to the present time (June, 1847). The first tooth made its appearance in September, and he now has fourteen, and has cut them all without the least accident. During the last eight months he has been remarkably fat and hearty.

"I am not aware that any medicine had any effect in removing the disease. Calomel in large and small doses, antispasmodics of all kinds, frictions over the spine, blisters to the back of the head, alteratives, laxatives, &c., were persevered in without benefit. On removing him to the country, and feeding him on milk warm from the cow, at first diluted, and afterwards pure, an improvement was speedily observed."

Dr. B. adds: "There cannot, I think, be any doubt that the disease originated in the stomach, and extended to the bowels, perhaps the liver, and to the nervous system."

Remarks.—The above case was evidently one of laryngismus stridulus. It must be clear to every one, I think, that the cause was seated, as Dr. Benedict remarks, in the digestive apparatus. The history of the case, the onset of the disease soon after the child was put upon artificial diet, the difficulty of finding food to agree well, the condition of the bowels, the offensive, bileless stools, the persistence of the case so long as the stomach continued feeble and the food improper, and the rapid improvement after the child had felt the tonifying influence of the country air, all seem to show conclusively that the difficulty was in fact disordered digestion.

I would recommend those who wish to observe still farther the influence of disordered digestion in the production of nervous disease, to peruse three cases detailed by Dr. Coley (*Pract. Treatise on the Dis. of Children*, Bell's edition, pages 233, 234, 235).

CASE BY THE AUTHOR.

The following case is one that I met with myself. I extract the account of it from a paper on croup. (*Am. Journ. Med. Sci.* April, 1847.)

The patient was a girl, five months of age. I saw the child on the 28th of March, 1844. The first attack occurred the day before I was called, but as the mother supposed it to be a matter of little consequence, she did not send for me until the next day. The child was well grown, and except a rather too great paleness, looked strong and healthy. It was playful and good-humored, nursed freely, had no fever, and between the paroxysms presented the appearances of perfect health. The crowing-fits occurred frequently in the course of the day and night, sometimes two or three times in an hour, or not so often. They often waked the little thing suddenly from tranquil sleep. They consisted of a succession of long and difficult inspirations, accompanied by a peculiar whistling or crowing sound, such as might be supposed to depend on the passage of air through a narrow aperture. During the attack, the face assumed an expression of great anxiety, the respiratory muscles contracted with violence, and there seemed to be for the time imminent danger of suffocation. After several seconds or a minute, the shrillness of the sound diminished, the struggling subsided, and soon the respiration became perfectly natural, and the child seemed well. The paroxysms were usually followed by fits of crying, which, however, were easily pacified.

The paroxysms gradually diminished in frequency and violence, and ceased entirely after the 13th of April. The treatment consisted simply in careful attention to the general health, and in the frequent use of warm baths and mild nauseants.

The child remained perfectly well, with the exception of a slight attack of cholera infantum, until the following November, seven months after, when the disorder recurred. Several paroxysms occurred between the 12th and 17th of the month, but as they were slight and unattended by other symptoms of illness, the mother was not alarmed, and paid but little attention to them. On the 17th of the same month, the child was sitting on the floor amusing itself with some playthings. There were no persons in the room except young children. They saw the little thing stoop forward suddenly, as though in play, and did not therefore regard it immediately. As it remained in that position, however, they went to it, took it up, and found it dead. It had perished suddenly, no doubt in one of the paroxysms of crowing.

An autopsy was made, in which the larynx and thoracic organs were examined, but nothing was found to explain the cause of the disease or the sudden death.

ARTICLE III.

CONTRACTION WITH RIGIDITY.

This is the disease called by the French *contracture.* I shall treat of it as idiopathic contraction with rigidity. It has been little known until within a few years, and yet is clearly not a *very rare* affection in Paris, from the number of cases on record in different medical journals and works. I have met with but one well-marked example of it myself in this country. This case, of which I shall give a sketch at the end of this article, and the one of laryngismus stridulus communicated to me by Dr. Benedict, and appended to the article on that disease, furnish very good examples of contraction coexisting with the former affection. I have seen also two other cases in which the contraction was decided, but in which it lasted but a short time.

The disease is evidently one of the forms of eclampsia, which assumes such a variety of shapes during infancy and childhood. Though it generally exists as an idiopathic and distinct malady, it is in other cases associated with, or follows laryngismus stridulus or spasm of the glottis, and in others again, is combined with attacks of general convulsions.

DEFINITION.—By idiopathic contraction with rigidity (*contracture* of the French writers), is meant the involuntary tonic contraction of different flexor muscles of the extremities, particularly those of the fingers and toes, but sometimes of the forearms and arms also, existing independently of organic disease of the cerebro-spinal axis. It has been described by different English writers in connection with laryngismus stridulus, under the title of "carpo-pedal spasms," "cerebral spasmodic croup," "croup-like convulsions," etc. etc. I believe, however, that it will be useful to describe it separately from that disorder, for though of the same nature, and sometimes associated with it, it often exists as an independent affection.

CAUSES.—It is most common between the ages of one and three years. It is much oftener sympathetic than essential, and its most frequent causes are dentition, disordered states of the digestive function dependent upon improper alimentation, anemia, and its accompanying nervous excitability, brought about by digestive and nutritive derangements, pneumonia, bronchitis, masturbation, and unfavorable hygienic conditions. In some few cases, the disease is truly essential, since no pathological cause for it whatever can be detected. It is merely necessary to say that it is often symptomatic of disease of the brain, but of that form of the affection nothing will be said in the present article.

NATURE OF THE DISEASE.—It appears to consist in a functional derangement of the true spinal system, occurring without any cause that can be detected, or determined by the existence of some irritation affecting incident excitor nerves. I once saw a child two years of age, who, after a restless, uneasy night, presented in the morning tonic contraction of the flexors of all the toes of both feet, so that the insteps were swelled, and looked smooth and polished. There was no other sign of sickness except peevishness. Learning on inquiry that the bowels had been somewhat constipated for several days, and that the materials of the scanty stools which had been discharged, were dark-colored and very offensive, I ordered a dose of castor oil containing two grains of calomel. The contraction continued unyielding until six o'clock in the afternoon, when a very copious, dark-colored, viscid, and offensive stool occurred, and the contraction immediately ceased. Here the cause of the contraction was evidently an accumulation of unhealthy fecal matter in the intestine, which, irritating certain sensitive cords of the excito-motory system, caused a reflex motor action that gave rise to permanent muscular contractions. In other cases the disturbance of the excito-motory system depends on the irritation of excitor nerves occasioned by the process of dentition, by indigestion, by diarrhœa, pneumonia, pleurisy, etc. In other instances, again, to which the term essential must be applied, it seems to depend simply on general debility and anemia, which are well known to be productive of functional disease of the nervous system.

SYMPTOMS; COURSE; DURATION.—The disease rarely attacks children previously in good health, but generally those already suffering from some disorder of the general health, or a severe local affection. When sympathetic, the first symptom noted is the contraction which constitutes the disease. When essential, on the contrary, the onset is sometimes marked by various nervous symptoms, such as giddiness, headache, or somnolence, which soon pass off, leaving the simple contraction with rigidity as the only disease. In most cases, however, the attack begins with the muscular contraction, which generally affects the superior extremities first, and gradually extends to the inferior.

When the disease is fully developed, the thumbs are drawn down into the palms of the hands, and the fingers, strongly flexed at the metacarpo-phalangeal articulations, cover and conceal the thumbs. At the same time that the metacarpo-phalangeal articulations are flexed, the phalanges themselves remain extended and the fingers are separated from each other. The contraction generally affects the wrist-joints also, so that the hands are strongly flexed upon the forearms, and in some rare cases the latter upon the arms. The disorder usually affects the inferior extremities likewise, the toes being in a state of tonic flexion or extension, the foot rigidly extended upon the leg, and its point sometimes drawn inwards. The spasm very rarely extends to the knees.

Children old enough to describe their sensations generally complain of stiffness in the affected parts, with more or less severe pains darting along the course of the nerves. The contracted muscles are hard and rigid to the touch, and sometimes enlarged so as to appear in strong relief under the skin. In slight cases the contractions can be overcome by very moderate force and without pain, whilst in those which are more severe, the attempt to overcome the contraction is productive of acute pain in the rigid parts. The backs of the hands and the insteps present a swollen appearance, and the skin over these points is smooth and polished. In the case communicated by Dr. Benedict, appended to the article on laryngismus stridulus, and likewise in my own case, the skin under the thumbs had assumed the appearance of mucous membrane, from the long and close confinement of the member.

In addition to the symptoms already enumerated as characteristic of the malady, there are others which require attention. The child is of course unable to walk or perform any prehensile movement. The intelligence and senses always remain perfect in simple, uncomplicated cases. The nervous system shows signs of disorder in the form of restlessness or languor, and irritability, with crying and peevishness. In the great majority of instances, these are the only nervous symptoms, though in some there are general or partial convulsions, strabismus, and diminution of sensibility. Of these the most frequent is convulsions, which generally come on a few days after the attack, or precede the fatal termination. In the case of Dr. Benedict, referred to above, there were occasional choreatic movements of the face, arms, and body. The simple disease is unaccompanied by any febrile movement, and the organic functions go on naturally. In the sympathetic form, on the contrary, we have the various symptoms of the disease which acts as the cause of the contraction, whether that be abdominal or thoracic. The most common train of symptoms, in young children, is the same as that which accompanies gastric or intestinal derangement, dentition, &c. The *course* and *duration* of the disease are very irregular and uncertain. When once developed it may last from weeks to months, either slowly increasing in severity, or remaining stationary for a length of time. As a general rule, after it has lasted for some time, it becomes intermittent, sometimes diminishing or even disappearing entirely for a period, then reappearing or increasing, to subside or cease again, and so changing without regularity or evident cause, until at last recovery gradually takes place, or death occurs from the concomitant disease, or in a paroxysm of convulsions.

Diagnosis.—The only difficulty in the diagnosis of idiopathic contraction is to distinguish it from symptomatic contraction, or that which depends upon cerebral or spinal disease. The kinds of cerebral disease which most frequently occasion contraction are tubercle of the brain, and meningeal hemorrhage. The distinction can generally be made with considerable facility, however, by attention to the various disorders of intelligence and sensibility, to the fever, constipation, vomiting, and different modes of invasion and progress which characterize the symptomatic form. The following table, taken from MM. Rilliet and Barthez, will assist in the diagnosis.

SYMPTOMATIC CONTRACTION.	ESSENTIAL CONTRACTION.
Cerebral symptoms, special functional disorders (convulsions, strabismus, dilatation of the pupils, &c.), preceding or accompanying the contraction.	Similar cerebral symptoms, but only in exceptional cases, sometimes accompanying, but never scarcely preceding the contraction.
In many cases irregularity of the pulse.	No irregularity of the pulse.
Generally partial, and commencing usually in the elbows and knees, and in a single extremity.	Binary, commencing in the fingers and toes.
Almost always permanent.	Remarkably intermittent.

Prognosis.—The prognosis must depend on the cause of the malady. The contraction itself has no influence whatever on the termination. The fatal termination has always resulted from the anterior or concomitant disease. Six cases observed by M. Barrier all recovered. The case communicated to me by Dr. Benedict, which was connected with laryngismus stridulus, and one very severe one that occurred in my own practice, also terminated favorably. The prognosis is favorable, therefore, when the attack occurs in a child of naturally good constitution, and when the cause of the disease is not a permanent or incurable one. The possibility of the occurrence of fatal convulsions should always lead us to make a guarded prognosis.

Treatment.—The treatment must depend on the circumstances under which the disease has made its appearance. When it occurs in the course of an acute local affection, the treatment must of course be that which is proper for the concomitant disorder. When it depends on dentition, or on gastric or intestinal derangement induced by improper diet, the treatment is the same precisely as that recommended for laryngismus stridulus dependent on the same causes.

It may be stated that, as a general rule, all violent remedies, as bleeding, calomel, except in very minute doses as an alterative, drastics, cathartics, and blisters, can scarcely fail to be injurious, unless manifestly necessary in the treatment of the concomitant affection.

It is proper in almost all cases to combine with the treatment already recommended, the employment of antispasmodic remedies, particularly when the contractions persist after the removal of the primary disease.

The best remedies of this class are the warm bath, used every day; orange-flower water; the fluid extract of valerian; assafœtida, and camphor. The diet ought generally to be nutritious and strengthening, particularly when the patient is weak and delicate.

In conclusion, I may state that the treatment should be very much the same as that proposed for laryngismus stridulus, and I therefore refer the reader to that subject for more detailed information.

CASE BY THE AUTHOR.

The subject of this case was a girl nine months old. The parents were healthy persons, but the mother, owing to some idiosyncrasy, had made but a poor nurse for the preceding child, and I had strongly advised her, therefore, at the birth of this one, to give it a wet-nurse. This was not done, however, and it was found necessary to feed the infant a great deal from its birth. During the early months of its life it had some slight attacks of disorder of the digestive system, but being taken to the country for several months in the summer, it there improved very much. On being brought back to town I saw it, and found it pretty well developed, but very pale, and, on the whole, delicate-looking. It was still nursed by the mother, but not to any very considerable extent, as it was obliged to be fed several times each day. The food consisted of different farinaceous substances made with cow's milk.

On the left forearm of the child there was situated a congenital aneurism by anastomosis, which had grown, by the age of nine months, to be as large as a five-cent piece. It was deemed necessary to remove this tumor, and, accordingly, on the 11th of January, 1852, a surgeon tied it with a needle and double ligature. The child bore the operation very well, was soon quieted, and was cheerful and ate well until the evening of the 15th, when it was attacked with fever, which lasted all night, and was accompanied with a good deal of cough and some gurgling in the fauces. On the following morning, at about 7½ o'clock, it had a slight convulsive seizure, lasting a few moments, and marked by stiffening of the body, and a staring expression of the eyes. In the middle of the day, it was seized again, and during that and the next day (17th), up to 10 P.M., it had twenty-four convulsions. These lasted from three to eight minutes each; they were general, and consisted of flexions of the limbs, working of the face, and were attended with unconsciousness. There was no opisthotonos during the attacks, no extensions of the limbs, and no contraction of the jaw. Between the seizures, the child nursed perfectly well, sucked the finger, had no stiffness of the lower jaw, and was perfectly conscious. There was, during these two days, some fever, as the skin was too warm, and the pulse between 161 and 180. The respiration was more frequent than natural, there was a good deal of cough, some catarrhal râles in the chest, and also some gurgling in the fauces. The stools were scanty, pasty, and white. There was a well-marked but rather faint rash on the limbs and trunk, like erythema or mild scarlet fever, and the lympathic glands on both sides of the lower jaw were somewhat swelled, and quite hard. The treatment directed was one-sixth of a grain of calomel every two hours; two drops of solution of morphia with five of fluid extract of valerian, to be given also every two hours; warm immersion baths, and mustard foot-baths. On the second day, blisters were applied behind the ears.

On the 17th the child was better. There was no convulsion; she noticed well, smiled a little, nursed heartily, and took some arrow-root water.

During all this time the tumor in the arm was not at all inflamed. It was neither red, sore to the touch, nor swelled. It was suppurating slightly. Under the idea that the convulsions might depend in part on the operation, and in order to promote suppuration, a warm poultice was kept constantly applied over the tumor.

The child continued better, with the exception of slight angina and severe cough, until the morning of the 22d, when it waked early, crying violently as though in severe pain, and I found the fingers of both hands strongly flexed at the metacarpal articulation over the thumbs, which were themselves drawn into the palms of the hands. The phalanges, though bent, as just stated, at the metacarpal articulations, were stiffly extended at the phalangeal articulations, and at the same time separated from each other. The hands were flexed at the wrists. The toes were flexed, and the feet stiffly cramped at the ankles, and the insteps, as also the backs of the hands, looked swelled and cushiony. Any attempt to open the hands was painful and caused crying. The pulse was frequent and small, the skin pale, and very slightly too warm; the intelligence was perfect. The jaw was open, and the act of sucking was performed, but with some difficulty. On the previous day the bowels had been opened three times, and on this day once; the stools were scanty, pasty, and white. At 9 A.M. I ordered two drops of solution of morphia, five of the fluid extract of valerian, and twenty of milk of assafœtida, to be given every two hours.

4 P.M.—Same state, except that the contraction is stronger. There is more heat of skin, much crying, and a restless, distressed motion of the head. At 4½ o'clock, two drops of laudanum were given with assafœtida. A teaspoonful of the following mixture was ordered every hour:

℞.—Mass. Hydrarg.,	gr. iii.
Ol. Ricini,	ʒiii.
Syr. Rhei. Aromat.,	ʒv.—M.

10 P.M.—Has taken three doses of the mixture and had one large, whitish, pasty stool. Much easier. Has slept a good deal. Contractions not so strong, as the hands can be opened more easily and with very little pain. Skin soft, of natural temperature, and moist. Ordered one or two more doses of the mixture, and a repetition of the laudanum and assafœtida, in case of restlessness.

During all this time the tumor has not separated. A process of ulceration is going on around the ligatures, but there is no inflammation of any consequence; the arm is not swelled, and there is neither redness nor soreness to the touch.

January 30th.—The contracture diminished very much for two days, and then returned, so that during the 27th, 28th, and 29th, it was very marked, the forearms being flexed on the arms, and the hands strongly flexed on the forearms. The feet also were very stiff, and strongly flexed. The head was occasionally but not constantly retracted upon the trunk. The child evidently suffered very much, as it cried constantly and was very restless, except when under the influence of anodynes or antispasmodics. The bowels are sluggish, but have been kept open by the oil and rhubarb mixture. The dejections were generally whitish and pasty, but occasionally there was a healthy yellow stool. On the 28th the following mixture was ordered:

℞.—Ex. Valerian. Fluid.,	ʒi.
Liq. Anodyn. Hoffm.,	ʒss.
Liq. Morph. Sulph.,	gtt. lx.
Syr. Tolutan.,	ʒvi.
Aquæ,	℥ii.—M.

A teaspoonful to be given every hour or two, when there is much suffering or restlessness.

On the evening of the 29th the ligatures were removed, as they had become entirely loose, though without cutting off the tumor. The diseased point was not much inflamed, nor was it very tender.

The child is still nursed and fed. Since the 29th it has had goat's instead of cow's milk. On the evening of the 30th, the patient was more tranquil, the expression was more placid and open, and the contracture not quite so strong.

Up to February 7th, there was no decided change in the symptoms. They continued quite as severe as before. The dyspeptic symptoms, the torpid state of the bowels, the want of appetite, and the white, pasty state of the evacuations were never relieved, except momentarily, by means of cathartics. On the 7th a wet-nurse was procured, but only after the most persevering and urgent solicitation and argument on my part, I having long been convinced that the cause of the contracture lay in the disordered state of the digestive functions, produced and kept up by artificial diet, and perhaps by an unhealthy state of the mother's milk. The parents, however, had always thought that the operation had been the cause of the convulsive disease, and for a length of time would not consent to a wet-nurse.

After the child had been suckled by the wet-nurse for two days, the stools, which, since the beginning of the sickness, now twenty-three days, and to a greater or less extent, since birth, had been very unhealthy, became yellow, homogeneous, and natural in character; while the bowels, instead of being obstinately constipated, so as to require large doses of cathartic medicine, were moved spontaneously two or three times a day.

On the 10th I noticed strong divergent strabismus, and the child looked very badly. The left leg was drawn up, whilst the right was stiffened. The left arm was more used than the right, the left hand being carried often to the mouth, while this was never done with the right. It was difficult to measure the degree of the intelligence, but the child occasionally looked at and evidently noticed objects, but during most of the time it was dull and inattentive.

On the 13th, there was an evident improvement, the previous night having been very good. The face was improved in color and expression, and was not quite so thin. The contracture was about the same.

14th.—Some diminution of the contraction, the forearm being a little extended upon the arm, and the wrists, though still very rigid, not quite so much drawn. The child looks better; she nurses a great deal, taking all that the mother, and most also of what the wet-nurse, a hearty woman, has.

February 20th.—Doing very well up to last night, when she became more restless, cried a great deal, rolled the head on the pillow, and had slight retractions of the whole trunk of the body. Occasionally she ceased to cry, scarcely breathed, and the eyes were rolled upwards and fixed for several seconds. She looked pale and pinched again and refused to nurse. Had one whitish, curdy stool. Ordered two grains of mercury with chalk at once, and two hours afterwards a teaspoonful of castor oil. Both of these doses were rejected by vomiting. Half a grain of the mercury was then given, which was also rejected. A quarter of a grain was now given, and this, with another dose, was retained. During the night, the bowels were moved several times, and the discharges looked better, after which she nursed a little.

21st.—Better; more quiet; nurses well. The boring with the head has ceased, as also the retractions of the trunk. One healthy stool.

22d.—Much better; nurses well; one healthy stool. The contraction of the right arm is yielding, and that of the forearm on the arm is gone on both sides. The left wrist is straight; the right one is yielding very much though it is still somewhat bent. The fingers of the right hand, though still bent, have relaxed very much; those of the left hand are still very much bent, but are less rigid than before. The integument of the palms of both hands has become, in the flexures, whitish, soft, moist, mucous-like, and has an offensive odor. To-day and yesterday the child uses the arms, touches, and reaches out for articles; she is much more intelligent, and looks at and observes objects; she now holds her head up, and likes to be carried about sitting up in the arms of the nurse, which before she could not do at all. She is gaining flesh; the color of the surface is improving; the ears have become pink and pretty.

A fresh assafœtida plaster was applied upon the back yesterday.

March 1st.—Continues to do well. The right hand is to-day almost natural, being opened and shut, and used to grasp with, though it still looks a little stiff. Left hand much better; she opens and shuts the forefinger, and grasps and hold toys with it, but the other fingers are still much contracted. The movements of the arms are quite easy and natural. There is no bending of the hands at the wrists, except perhaps very slightly in the left extremity. The feet are natural, excepting a slight stiffness. She now nurses very well, and is growing fat. She is larger, in fact, than before the sickness. The intelligence is improving rapidly, as she notices, smiles occasionally, and distinguishes, her attendants think, between persons. The bowels are regular without medicine. She has taken no remedy of any kind for three days past.

March 11th.—Almost entirely recovered. There is still a slight but only very slight, flexion of the fingers of the left hand. General health excellent.

March 29th.—The patient is now perfectly well, except that she uses the forefingers of either hand rather better than all together, so that in grasping and holding an object, she is more apt to seize it with the forefinger than with all. Still, she can, and does, grasp with all, when the object is large, and no one, unless very observant, would notice the peculiarity just described. Embonpoint very good; complexion clear and healthy; sleep sound; bowels in excellent condition. Intelligence perfect; smiles and laughs a great deal, and distinguishes between persons; takes a great deal of notice. She is about equal in intelligence to a child of eight months old. Does not attempt to speak.

April 10th, 1852.—I was sent for to-day. The child had not been well for three days, having had three or four thin and greenish stools a day, with whitish specks in them. She was fretful and did not sleep well, and had a good deal of loose catarrhal cough and some acceleration of the breathing. I found her in the morning, after a restless night, quite feverish, hot and dry, with frequent respiration, and with some catarrhal wheezing in tho chest. She had coughed a good deal, and her mother had found her hands showing some signs of spasm, the forefingers being extended as though pointing, and separated from the other fingers, which were flexed, with the thumbs also, into the palms of the hands.

There is some degree of laryngismus, as on waking from sleep the breathing is labored, difficult, partially suspended, and accompanied with a slight crowing, or rather choking sound, while at the same time the face becomes pale and the mouth bluish. Bowels open three times yesterday, the stools being mucous, greenish, and containing small lumps of undigested caseum.

Ordered a quarter of a grain of mercury with chalk diffused in a teaspoonful of syrup of jalap, to be given every two hours.

At 1 P. M. there was a slight general spasm, with stiffening of the limbs and retraction of the head, lasting, however, only a few moments. This occurred again in the afternoon. The dose of the mercury and jalap was reduced one-half in the middle of the day, as the quantity first ordered was found to cause sickness and vomiting.

Evening.—Rather better. No fever; some moisture of the skin; spasm of the hands very much relaxed. The diminished dose of mercury and jalap was well borne.

11th.—Rather better. Some fever still, with cough, gurgling in the throat, and distinct enlargement and hardening of the lymphatic glands at the angles of the jaw on both sides. There is still some contraction of the hands. Bowels open freely twice last night, and the stools better, being of a pale yellow color, and more homogeneous. The jalap and mercury to be suspended.

In the course of the day there were two slight general spasms, with laryngismus. The latter occurred several times during the waking state, but was not severe. Ordered three drops of syrup of ipecac., with four of sweet spirits of nitre, to be given every two hours.

12th.—Much better. Contraction of hands almost gone; very slight feverishness; cough less frequent and looser; respiration easy. No spasm to-day. Stools more healthy, yellow, homogeneous, and of natural quantity.

13th.—Continues better. Contracture slight. Cough diminishing very much.

14th.—Rather pale, dull, and languid. Has had several attacks of laryngismus, one of which was quite severe, being attended with deep blueness about the mouth, and some of the face also. Does not nurse so well as formerly. The hands exhibit decided flexion of the third, fourth, and fifth fingers at the metacarpo-phalangeal articulation, with stiffened extension of the other phalangeal articulations. Thumbs slightly drawn into the palms, and the forefingers rather extended. Bowels natural. Ordered fifteen drops of brandy, and a very small pinch of the Quevenne's metallic iron in powder, three times a day.

15th.—Condition about the same. On the 22d of March, the first wet-nurse, under whose charge the child had improved so rapidly, was changed, on account of some objection to her personal appearance, and another one procured in her place. This one was a healthy-looking woman, with milk enough, but she was red-haired, irritable, and excessively high-tempered, and the child has been losing ground ever since her arrival. Under the idea that her milk did not suit the child, a third nurse was, by my advice, obtained to-day (15th), a calm, placid, fat, and comfortable-looking woman, with an abundant supply of milk of ten months old.

17th.—The child has improved very much. She is fatter already, has a contented, tranquil expression, takes more than she did from the previous nurse, and rejects much less of the milk. The stools are now regular, occurring twice daily without aid, and of a natural appearance. The sleep of the child is better now than it has been at any time since the first wet-nurse was dismissed. The attacks of laryngismus are already much less frequent, and less severe. The hands are very nearly in a natural condition. The child is less nervous, not starting now as formerly at sounds.

To continue the brandy and iron.

From this period the child continued to improve regularly in health. She was removed to the country during the summer months, and when brought back in the autumn was entirely well, with the exception that she was less forward in walking than most children, but not more so than might have been expected in one who had been dangerously ill for so long a time. Her intelligence was good in all respects.

February 5th, 1853.—I have seen this child to-day, and find her in very good health, except that she is rather smaller in size than is usual at her present age. She has been weaned now for about six weeks, and eats heartily and digests well most ordinary food, as milk, meat, potatoes, &c. The weaning was borne very well, except that the appetite was rather deficient and capricious, for about a week after the departure of the nurse. She can stand up when placed in the erect position, and can walk feebly when well supported, but not alone, nor can she rise up from a sitting posture. Her intelligence is, in all respects, perfect, but she does not talk as yet. There is no vestige of her former spasmodic symptoms, when she is in good health; but any little turn of sickness reproduces some contraction of one leg, and a slight flexion of the hands.

Some months after this, the child was unfortunately seized with hooping-cough. She did well for several weeks, but one day, being seized with a fit of coughing while seated upon the floor playing, died instantly, doubtless from asphyxia caused by complete closure of the glottis by spasm. This was the only case of hooping-cough that I have ever known to prove suddenly fatal in this way. There is every reason to suppose that the fatal suspension of respiration was caused by the unnatural excitability of the sphincter muscle of the glottis, left by the previous attack of laryngismus stridulus.

ARTICLE IV.

CHOREA.

Definition; Synonymes; Frequency.—Chorea is a non-febrile, convulsive disease, characterized by irregular and imperfectly co-ordinated, but not completely involuntary contractions, of different parts of the muscular system, and particularly of that of the extremities.

It is called also St. Vitus's dance, chorea sancti viti, choreomania, epilepsia saltatoria, and by various other titles.

Without being very rare, chorea is certainly not of very frequent occurrence. M. Rufz states that of 32,976 children admitted into the Children's Hospital of Paris in ten years, only 189 were affected with chorea, or 1 in 377. (*Dict. de Méd.* t. vii, p. 544.) I have met with but nine cases in private practice in the course of several years' experience.

Predisposing Causes.—*Age.*—Chorea very rarely occurs during infancy. According to M. Rufz, it is seldom met with between one and six years of age, since of 189 cases, in only ten did it occur within that period; while between six and ten years of age it is much more common (61 in 189 cases); and between ten and fifteen years still more so (118 in 189).

M. Sée, in a valuable essay on chorea, and the relations of rheumatism and diseases of the heart with nervous and convulsive diseases (*Mém. de l'Acad. Nat. de Médécine,* t. xv, p. 373), states (page 448) that of 531 cases of chorea treated in the Children's Hospital at Paris, during a period of twenty-two years, 28 were under six years, 218 between six and ten years, and 235 between six and fifteen years of age. M. Sée concludes, after carefully sifting the facts, that the true maximum of frequency is comprised between six and eleven years of age, and that it corresponds especially to the tenth year. Under six years of age it becomes more and more rare as we approach the moment of birth. MM. Simon and Constant, however, met with it in nursing children of twelve, six, and four months of age.

Sex.—It is much more frequent in girls than boys. Of the 531 cases cited by M. Sée, 393 occurred in girls, and only 138 in boys. This is the same result as that attained, M. Sée remarks, by Reeves, Good, &c.,—131 girls in 186 cases. *Rapid growth* and the *second dentition* probably act, in a considerable degree, as predisposing causes of the disease. Particular attention is drawn to these conditions by MM. Rilliet and Barthez, and the precise age at which it is most frequent (between six and eleven years), would seem to show that they exert a very positive influence. The general deterioration of the health, resulting in anemia, and the exaggerated nervous susceptibility, so often observed at these periods, are probably the immediate causes of the frequency of the disease at this epoch of life.

Constitution does not seem to exert much influence in its production, though it is generally thought to be most apt to occur in children of delicate, excitable, and nervous temperament. The belief in *hereditary* predisposition seems to be unfounded. The disease appears to commence more frequently in summer than in winter, and yet it is scarcely known in tropical climates.

Rheumatism.—M. Sée (p. 414) is of opinion that of the different morbid conditions which contribute to the production of chorea, one of the most efficacious is rheumatism, whether this be apyretic or attended with a febrile movement. He asserts, after much examination of this subject, that half the cases of chorea are dependent on the rheumatic principle. MM. Rilliet and Barthez, whilst they admit the not infrequent coincidence of rheumatic disease with chorea, are of opinion that M. Sée exaggerates the importance of rheumatism as a cause. They say (2ème édit. t. ii, p. 587): "Lastly, in admitting the existence of rheumatic chorea, it must not be forgotten that the disease is frequently of a different nature, and that we meet in authors with incontestable examples of chorea consecutive to chronic diseases that have produced a debilitated condition of the economy, or to acute affections. Amongst the former, we will cite with M. Sée himself, chlorosis, anemia, and tuberculosis; and amongst the latter, the verminous disorders, pneumonia, the eruptive, typhoid, and intermittent fevers."

EXCITING CAUSES.—Of many exciting causes that have been mentioned by different writers, the one most frequent and most clearly proven, is the influence of terror. Besides this are cited imitation, blows and falls upon the head, fits of violent anger, contrarieties, masturbation, the difficult establishment of the menstrual function in girls, or suppression of that function, and the sudden drying up of ulcers or eruptions. Various diseases have been thought to occasion chorea, particularly those of the gastro-intestinal tube.

Anatomical Lesions.—It has been shown by the researches of many different observers that there is no characteristic anatomical alteration in chorea, since in a large majority of the cases examined after death, no lesion of the cerebro-spinal axis can be detected. In some instances, however, lesions of those organs have been met with. M. Sée (*Loc. cit.* p. 390), concludes thus in regard to the anatomical alterations, after a careful examination of 84 autopsies: "1. It may be stated therefore that, in most of the cases, and especially in those most strongly attested, chorea is the result of the rheumatic diathesis, and that it reveals itself by plastic inflammations of the cardiac membranes, of the pleura, and of the peritoneum, with or without articular rheumatism (34 cases in 82).

"2. That if, the other conditions being imperfectly determined, the choreatic phenomena are accompanied with effusion into the arachnoid, or with disorganization of the substance of the brain, it is rare to find a direct relation of cause and effect between the anatomical state and the functional disturbances. Unless they all depend upon a common cause, as the tubercular diathesis, they show in general only doubtful and uncertain relations, the result of fortuitous coincidences.

"3. Lastly, there are cases of chorea (16 in 84, or 1·5) which seem to be independent of any appreciable modification of the nervous system, or of any general alteration of the economy; such cases may be looked upon as essential nervous affections, that is to say, as neuroses."

Symptoms; Course; Duration.—The disease may be general or partial: in the first case it affects all the limbs, the face, and some of the muscles of the trunk; in the second it implicates only one side, the upper extremities, or a single member. It has been asserted that often only one side was affected, and that in most of the cases it was the left. This is denied, however, by MM. Rilliet and Barthez, who state that they have met with but a single instance in which it was confined to one side throughout the attack. Of seven cases that I have seen, it was general in four, and confined entirely to the right side in one, and to the left in two. I shall describe first the prodromes of the disease, then the invasion, and afterwards the symptoms as they exist in fully developed cases.

Prodromic Symptoms.—It is doubtful whether there are, as a general rule, any well-marked prodromic symptoms. The only ones that have been mentioned with any authority are irritability and peevishness of the temper, an unusual degree of impressibility, languor, debility, disturbance of the organic functions, exhibited by deranged appetite and an irregular state of the bowels, and, after a time, a certain quickness and irregularity of the movements, which mark the commencement of the characteristic symptoms of the malady.

Invasion.—The onset of the disease is, as already stated, either sudden or gradual, so that there may be several days or more before it reaches any considerable degree of severity, or it may, particularly when the cause has been of a sudden and energetic nature, reach its height in a few hours. In most cases, however, it begins with some unusual and singular movements in one of the upper extremities, and as a general rule in the left. The choreatic movements are often observed first in the fingers, and at the same time or soon after, in the face. Sooner or later they increase in severity, and extend to the other arm, to the legs, and to the tongue, and the disease is fully developed.

Symptoms of confirmed general chorea.—When the disease has become fully confirmed the movements are exceedingly diversified and irregular. The limbs are agitated by involuntary contractions of the muscles into every attitude possible for them to assume. The fingers are opened and shut, brought together or separated, without any regularity. The hands are flexed and extended upon the forearms, or pronated and supinated, whilst the forearms are flexed or extended upon the arms, and the arms moved at the shoulders into every imaginable position. Such are the irregularity and rapidity of the motions that it is often with great difficulty that the patient can seize anything with the hands, and when once the object is attained, he frequently cannot do with it what he wishes. This imperfect control over the hands and arms sometimes prevents the patient from carrying food and drink to the mouth, excepting with the utmost difficulty, and may make it necessary to feed the child.

The inferior extremities are affected in the same way as the arms. Walking is always more or less difficult, and in some severe cases impracticable. The patient totters from side to side, or walks rapidly a short distance, and then suddenly stops. Sometimes the progress is accomplished in a zigzag direction, and at others by fits and starts as it were, whilst in others again, the walk is rapid and sudden, almost a run. The child often falls while walking or running, either from meeting a slight obstacle, or in consequence of the irregular and imperfect muscular action. In some instances standing is impossible, the knees bending suddenly under the weight of the body. It was no doubt the peculiar irregular and dancing movements of the inferior extremities during the attempts to walk and stand, that gave to the disease its original name of St. Vitus's dance.

The convulsive movements of the face and head are not less singular than those of the limbs. The face is distorted into all kinds of expressions, so that it assumes by turns that of the most opposite emotions,—sadness, terror, joy, or grief. The mouth is opened and shut, or its corners drawn apart, with the greatest irregularity; the tongue is occasionally protruded between the teeth, and sometimes moved rapidly in the mouth, so as to cause a clacking sound; the lower jaw is depressed and elevated, or moved in a lateral direction, and with such violence perhaps as to injure the tongue or teeth. In consequence of the irregular motions of the tongue and mouth, articulation becomes difficult and the child either stutters, or speaks slowly and badly, or can pronounce only monosyllables. In a case that occurred to myself, the movements of the mouth and tongue were so violent and uncontrollable that the patient, a boy nine years old, lost for three weeks all power of speech. He was at the same time unable to open or shut the mouth at will, or to swallow at the proper moment, so that in the act of feeding him, which became necessary from his entire want of control over the arms, the food was constantly spilled and spluttered about as though by an idiot. The act of mastication also was quite impossible, so that he could take nothing but fluids for a number of weeks. In another case also that occurred to myself, in a girl between eight and nine years of age, and which moreover was a relapse, the patient exhibited the same inability to feed herself, and the same difficulty in regard to mastication, so that she had to be nourished for several weeks on soft food. The speech was likewise greatly affected, it being very difficult to understand her muffled, thick, and indistinct utterance.

Whilst the face and limbs are contorted as above described, the head is moved rapidly from side to side, or backwards and forwards, or undergoes constant rotation, and, in some instances, as in two that came under my own notice, all power over the muscles of the back of the neck is lost, and the head falls from side to side, or forwards, as in an infant. In severe cases the choreatic movements affect the trunk also, so that the patient cannot lie upon a bed, but rolls and twists about the floor with such violence as to bruise and excoriate the skin. Deglutition is sometimes slightly embarrassed, and the child is obliged to swallow with great rapidity; in some few cases a peculiar loud cry, like that which occurs in hysteria, dependent apparently upon spasm of the larynx, has also been observed. The organic muscular apparatus is probably never affected with true choreatic spasms.

The disease is unaccompanied by pain unless it be attended with some complication, and what is very singular and remarkable, the constant and often very violent muscular contractions do not seem to occasion fatigue.

The general symptoms require some attention. The choreatic movements are almost always increased by emotion, as terror, anger, contrarieties, and by the consciousness of being observed. Sleep generally suspends them entirely. In very bad cases they are said to produce insomnia, or to wake the child frequently in the night. The intelligence is rarely affected, except in very severe and long-continued attacks. The temper is often irritable and capricious. General and special sensibility commonly remain natural. In simple, uncomplicated attacks, the pulse, as a rule, remains natural; the appetite is preserved; there is no unusual thirst, and the bowels continue regular.

It is said that idiocy is apt to occur in cases which last for a number of years.

The *course* of the disease is acute or chronic. In a large majority of cases it is acute, the symptoms becoming more and more violent until they reach their height, when they remain stationary for a time, and then subside and disappear under the influence of treatment, or in the natural course of the malady. In fatal cases the symptoms are constantly aggravated; the movements become so violent as to make it necessary to secure the child in bed, or in a strait-jacket; the patients, deprived of sleep, become feeble and emaciated; the respiration becomes difficult; intelligence is abolished; the pupils are contracted; and the child dies.

The *duration* is irregular, varying in acute cases between one and three months. The average duration is probably about six or nine weeks. In very slight attacks it may be much less. The duration of chronic cases is from months to years. In fatal cases the duration is sometimes very short. In one it was nine only, and in another twenty-seven days.

Relapses.—Relapses are quite common. They occurred in two of the seven cases observed by myself. In one of these the relapse was much worse than the first attack. It was one of the most violent and prolonged that I have seen. MM. Rilliet and Barthez state that they occurred in six out of nineteen cases seen by them. The relapses in these cases occurred once, twice, and three times. M. Sée (*Loc. cit.* p. 408), says that it is not uncommon, after some weeks of respite, or several months of apparent recovery, to see the disease reappear with renewed intensity, and be thus repeated twice, thrice, and even seven times in succession. Out of four patients, at least one, he states, remains thus under the influence of the disease. Of 158 cases he counted 37 relapses, of which 17 were arrested after the second attack; 13 suffered a third, and 6 a fourth attack; and lastly, one had seven distinct seizures, each one of which was separated from the following, by a well-marked interval.

NATURE OF CHOREA.—Some doubt exists as to the nature of the disease under consideration. That it is not, in a large majority of the cases, an organic affection of the nervous centres is clear from the whole history of the malady, from the great variety of lesions found in some instances, and from the total absence of anatomical changes in others. Dr. M. Hall regards it as an affection of the true spinal system, but in this he is opposed, and I think with reason, by Dr. Carpenter, who says (*Principles of Human Physiol.* Lond. note, p. 234): "It is true that there is considerable irregularity in the ordinary reflex actions; but the irregularity is still greater in those to which volition or emotion are the stimuli. Moreover, the body is at rest during sleep; and the 'spinal system never sleeps.'" Dr. C. is disposed to think that the cerebellum, which is the organ that co-ordinates and harmonizes the muscular motions, is probably the chief seat of the disease, and this, it appears to me, is the most reasonable theory which has as yet been offered in regard to the real nature of the affection. The disease is, nevertheless, sometimes symptomatic of organic lesion of the nervous centres. Thus, MM. Rilliet and Barthez refer to one case in which they found a slight degree of softening of the spinal marrow, and they quote cases from Mr. Prichard, in which serous effusion and injection of the meninges were discovered; from M. Serres, who found inflammation of the tubercula quadrigemina; of hypertrophy of the cortical substance of the brain, from M. Ménard and M. Hatin; of cretaceous concretion of the brain, from M. Guersant; of tubercles of the brain, from Georget and Dr. Headington; and of softening of the hemispheres, from M. Gendrin. They conclude, from these facts, that the disease is either essential,—a simple neurosis, or symptomatic of some morbid alteration of the brain, or spinal marrow.

DIAGNOSIS.—The diagnosis of chorea cannot be attended with any difficulty, and I shall therefore make no remarks upon it.

PROGNOSIS.—Idiopathic, simple chorea, independent of organic disease of the nervous centres and of complications, is rarely fatal. Nevertheless, even under these circumstances, it sometimes terminates fatally, since MM. Rufz, Legendre, and Rilliet and Barthez, have each met with an instance. M. Sée (*Loc. cit.* p. 406) states that of 158 cases, 4 passed into the chronic condition, and 9 proved fatal. When the disease, on the contrary, is occasioned by an affection of the brain or spinal marrow, it becomes very dangerous. The degree of danger will depend on that of the disease which determines the chorea.

Dr. Copland states that he has met with three or four fatal cases, that Dr. Prichard has recorded four, and that Dr. Brown refers to three in his practice; but he does not inform us whether they were idiopathic, complicated, or symptomatic.

Whenever, in a case of chorea, the convulsive motions become incessant, and the respiration embarrassed, and still more when subsultus tendinum takes the place of the choreatic movements, a fatal termination is greatly to be apprehended.

TREATMENT.—Many different plans of treatment, and a great variety of drugs have been proposed for the cure of the disease under consideration. These facts alone may serve to teach us that the effects of treatment are not clearly appreciated, and also, when taken in connection with the circumstance that fatal cases are rare, that the disease tends naturally to recovery in a good proportion of the cases. This feature of the natural history of the disease is shown also by the evidence given by Dr. Bardsley, senior, who mentions, that in the Manchester Infirmary, notwithstanding the variety of treatment adopted by successive practitioners, an incurable case had not presented itself in the course of thirty-three years. (*Tweedie's Lib. Pract. Med.* Am. Ed. vol. ii, p. 46.)

The only rules to be laid down for its treatment are those which apply to all the convulsive affections depending on functional disorder of the nervous system, and on disordered states of the general health, connected with a faulty condition of the functions of digestion and assimilation. These are attention to the general health, and especially a careful regulation of the diet and other hygienic conditions of the patient, and the use of tonics and iron, the removal of any local derangement or disease that may exert an unhealthful influence upon the nervous system, and the employment of such remedies as have been found to exert a controlling effect upon spasmodic and convulsive affections generally, and upon this disease in particular.

I shall consider, under different heads, the various means that have been recommended, endeavoring in the course of my remarks to distinguish the cases to which each remedy is best adapted.

Purgatives.—This class of remedies has been extensively employed and often exclusively relied upon by some very high authorities, especially the English. When relied upon exclusively in the treatment, an active cathartic is given every day, or every second or third day; and there can be no doubt that many cases have recovered under this plan. In my own practice I must say that the treatment by cathartics alone has never succeeded well, and I have only used them of late to such an extent as was necessary to secure a soluble and healthful condition of the bowels. When, therefore, the stools are natural and healthful in all respects, I do not think it proper to employ powerful purgatives in the treatment of the disease. I resort to them only when there is constipation, or when the discharges present some unnatural appearances as to color, odor, etc. Under the latter circumstances we may resort to any of the somewhat active cathartics, as cream of tartar and jalap, sulphate of magnesia, rhubarb, aloes, etc. When the discharges from the bowels are clay-colored, or dark and offensive, when the mouth is pasty, the tongue loaded with a thick yellowish fur, and the breath heavy, it is proper to employ a mercurial. Dr. Copland advises that we should commence with the exhibition of a full dose of calomel, either alone or with other purgatives, or followed by them in five or six hours. He adds that the doses of calomel ought not to be frequently repeated in the disease, and thinks that it is not serviceable "to continue purgatives long, without either exhibiting them with a bitter tonic or antispasmodic remedy, or with both, or alternating them with those remedies."

Bloodletting can rarely be necessary or proper. The only circumstances that would call for its employment, are severe headache, with signs of determination of blood to the brain, and the occurrence of the disease in a girl at the age of puberty, in whom there is reason to suspect that the cause of the disorder is the want of the menstrual function. In both these cases it is best to employ local bleeding; in the first to the temples, or behind the ears; in the last to the groins and upper parts of the thighs. It is proper to remark, however, that general bleeding has been recommended and practised by some most distinguished physicians. The evidence of late observers shows, nevertheless, that it is rarely, if ever, necessary, and there are many cases in which it could not fail to aggravate the already excessive excitability of the nervous system.

Antispasmodics are amongst the most important remedies we have to oppose to the disease. The weight of evidence seems to show, indeed, that they, in conjunction with a moderate use of purgatives, of tonics, especially ferruginous tonics, of certain and particular remedies, and careful regulation of the hygienic conditions of the patient, ought to constitute the treatment in the great majority of cases. Of the various remedies of this class that have been employed, those which have exerted the most beneficial influence are valerian, assafœtida, oxide of zinc, camphor, and the root of the cimicifuga or black snake-root.

Particular remedies.—Of the remedies belonging to this class, the one most employed in this city at present is, I think, the cimicifuga. This was first introduced into use by Dr. Jesse Young, and is now extensively employed and much relied upon. Dr. Wood (*Pract. of Med.* vol. ii, p. 755), says: "I have in repeated instances found it of itself adequate to the cure of the disease." I have employed it myself only in four primary cases, and in two cases of relapse. In three of these, the children recovered entirely under its use; in one it failed to do any good, and recovery took place under the use of iron, the sea-bath, and in the course of time. In the two relapsed cases, the patients recovered finally under the use of the cimicifuga, iron, cod-liver oil, and good diet. One of the cases that recovered under its use was much the worst I have ever met with. It was that of a boy of nine years, in whom the disease went so far as to destroy all power of locomotion. The child was unable even to stand. At the same time the movements of the lips, cheeks, and tongue, were so violent and irregular, and so little under the control of the will, that the power of speech was lost entirely for a period of four or five weeks. The choreatic spasm appeared to affect even the muscles of deglutition, so that the act of swallowing was often difficult and uncertain. Mastication also was impossible, and the child was unable to carry anything to his mouth, rendering it necessary to feed him, as one would a baby, with soft solids and fluids. During some two months, the muscles at the back of the neck were so weakened that the head could not be lifted from the pillow or held erect, but fell from side to side or forwards like that of an infant. The condition of the child was altogether one of the most complete and distressing helplessness. During the first month of the case, it was treated with active cathartics, chiefly very large doses of cream of tartar and jalap, and with iron, but as the symptoms became worse and worse, the cathartics were abandoned except so far as to maintain by the occasional use of rhubarb and senna, a soluble state of the bowels, which were very much disposed to constipation. The patient was now put upon the use of decoction of cimicifuga, of which he began with four ounces, soon increased to half a pint per day, made in the proportion of half an ounce to the pint. The iron was continued. Under this treatment he very soon began to amend, and in two weeks showed a very decided improvement. Cod-liver oil was now added to the iron and cimicifuga, and in six weeks he was in great measure restored to health, and in the end recovered completely. In another case, almost as bad as this, the patient finally recovered under the same treatment.

The cimicifuga is given in powder, tincture, or decoction, and should be continued for several weeks in gradually increasing doses, until some visible effect is produced, as nausea, headache, vertigo, or disordered vision. The usual doses are from half a drachm to a drachm of the powder, from one to two ounces of the officinal decoction, and one or two drachms of a saturated tincture, given three times a day. For my own part I prefer the decoction, of which I give to children of eight or nine years old, from four ounces to half a pint a day, made in the proportion of half an ounce of the root to a pint of boiling water. Prepared in this way, it is not a disagreeable drink, and is usually taken without much objection.

The French authors recommend chiefly valerian, oxide of zinc, and assafœtida. Of these the one which has the highest reputation is valerian, and from the evidence adduced in its favor there can be no doubt that it exerts a very beneficial effect upon the disease. It may be given in the form of powder, infusion, or fluid extract. The dose of the powder is from twelve to eighteen grains in the day, to commence with, to be rapidly increased to several drachms, as the stomach becomes accustomed to it. It may be given in honey or preserve-syrup. I should prefer the fluid extract, of which half a teaspoonful may be given to a child eight or ten years old, three times a day, and the quantity gradually increased. The oil of valerian is employed by some practitioners. Oxide of zinc is given in doses of a grain every three hours to children eight years old, and is much relied upon by some practitioners. Assafœtida is recommended both by English and French writers. It is best given in pill, on account of the nauseous taste of the mixture. Two three-grain pills may be given to a child of four or six years of age, three times a day. Dr. Bardsley gave it by injection, in combination with laudanum, every evening, after using musk and camphor through the day.

Narcotics have been recommended by some writers. Those which are most employed are opium, belladonna, stramonium, and of late, strychnia. Substances of this class are seldom, however, made the basis of treatment. Opium is useful in some cases in which the agitation is very great, so that the sleep of the child is much disturbed, but it is seldom necessary except as an adjuvant to other means; and the remark applies equally to other remedies of the class. Within a few years M. Trousseau has employed with success the sulphate of strychnia.

Tonics.—Whenever the disease occurs in debilitated and anemic individuals, remedies of this class are evidently necessary, and prove of great efficacy. The ferruginous preparations are those most clearly indicated under the circumstances. Any of them may be selected. The best are the subcarbonate, Vallet's pills, and the pure metallic iron (Ferrum per hydrogen). Quinine is also recommended when the patient is feeble and weak. It may be given alone or in combination with iron. The citrate of iron and quinine would form a very good prescription under the circumstances mentioned. Cod-liver oil is an admirable remedy when the child is thin and weak, and especially when there is cause to suspect any tubercular predisposition.

The cold plunge and shower bath have also been resorted to by a number of practitioners, and there is evidence to show that they have often proved useful. The cases in which they are used should be selected, however. They ought not to be employed unless followed by full reaction, nor unless the child is willing to take them. When the use of the bath terrifies or shocks the patient greatly, it cannot be proper. A warm or tepid bath used once a day, or every second day, would always be useful in promoting the general health, when the cold bath is not borne well.

Sulphurous baths have been recommended and employed with much success, by M. Baudelocque of Paris. A rapid and definite cure was obtained in 58 out of 65 cases. Thirty drachms of sulphuret of potash are added to each bath, which is employed for at least one hour daily, at a temperature of 91°. Generally amelioration occurs after the second or third bath, but sometimes not until after twelve or fifteen days, a mean of twenty-two days having served for the cure of fifty out of fifty-seven cases. Where the case is retarded, it ordinarily depends upon the patient's powers being lowered by other remedies or insufficient diet, upon irritation of the skin induced by the bath, or upon acute irritation of the internal serous membranes: circumstances contraindicating the baths while they continue. The conjunction of other remedies retards rather than aids the case. Deducting the cases in which the bath was improperly used under the above circumstances, there remain but nine true failures in eighty-one cases, these being almost all recent or rheumatic choreas. (Dr. Sée, of Paris, on Chorea, *Ranking's Abstract*, No. 16, p. 51.)

A great variety of remedies besides those we have mentioned have been employed, and have more or less evidence in their favor. Amongst them are sulphate of zinc, nitrate of silver, subnitrate of bismuth, iodine, arsenic, and a host of others which it is useless to enumerate. The sulphate of zinc has undoubtedly proved efficacious in some instances. About two grains may be given at first three times a day, and gradually increased to six or eight if the stomach bears the remedy well.

Counter-irritation to the spine, in all its shapes, from pustulation with tartar emetic, issues, and blisters, down to frictions with coarse towels, have been proposed and employed in the treatment. The use of any but the milder remedies of this class is unnecessarily harsh and cruel, except when the disease is evidently dependent upon an affection of the brain or spinal marrow. The great majority of cases will recover perfectly well without a resort to such violent means, and they ought therefore to be avoided.

Electricity has been resorted to, and apparently with good effects in some instances, and it might therefore be tried when other and simpler means fail, or in conjunction with these means.

Gymnastic exercises.—M. Sée (*Mém. de l'Acad. Nat.* t. xv, p. 481) says that this method is one of the best that has been employed. He states that it was recommended by Darwin, and then by Mason Good, and was first employed by Louvet Lamarre in one case, after which it fell into oblivion until some of the physicians of the Children's Hospital, at Paris, and amongst others, MM. Bouneau, Baudelocque, Guersant and Blache, "struck, no doubt, like myself, with the good effects of gymnastics in scrofula and other cachectic diseases, and taught especially by the effects of musculation on the general health, conceived the idea of applying this treatment to nervous diseases, and particularly to chorea, which, besides the perturbation of the nervous system, is so often attended with disorders of nutrition and of the functions of organic life. To put a stop to this state of languor, to re-establish at the same time the equilibrium of the movements, which are rather irregular than convulsive, to endeavor, in fine, by regulating the contractions, to break up their vitiated habit,—this is the triple object sought to be attained by gymnastics. Be it theory or empiricism, success crowned these previsions, and proved the utility of the new treatment, of which we are about to study the methods and its consequences." M. Sée says, that to commence the treatment, we must prescribe first simple and cadenced movements, and exercise at the same time the larynx by means of singing. "To place the child in a vertical position, make it flex and extend the knees, touch the ground, stretch out and bend the arms, harmonizing at the same time these various movements by regulated singing,—such are the first means by which to replace the contractions under the power of the will. This end will be so much the more rapidly attained, as the attention of the patient is the less distracted, its intelligence the less changed, and its temper the less capricious: so also is it often impossible to succeed unless we first obtain control over the patient by kindness and gentleness.

"After reaching this point, we may attempt walking, regulated to a slow or quick step, running, jumping, hanging by the arms, or other more complicated movements, always graduating them to the degree of the disease, watching them most carefully, and repeating them daily without prolonging them beyond fifteen or twenty-five minutes, in order to avoid muscular fatigue and palpitation of the heart, which occur sometimes when the exercises are too long continued.

"With these precautions, and no matter how severe the symptoms, we may, after a few lessons, and sometimes after the first, and at latest after the fifth or sixth, perceive a manifest change in the abnormal mobility, which is usually so rapid that we are generally able to decide, after the first eight days, as to the efficacy of the treatment. When, after this length of time, the patient can neither stand erect, walk in a straight line, nor hang by the arms, there is reason to fear that the method will fail; it is at least certain that it will be tedious and difficult."

In Ranking's Abstract (*Loc. cit.* p. 50) may be found the following statements in regard to the treatment by gymnastic exercises:

They were first employed under the guidance of M. Laisné, gymnastic professor of the Polytechnic School, their effects being tried first on scrofulous children. "Commencing with simple movement of the legs and arms, accompanied by appropriate songs, the children's progress was so rapid, that they were soon able to employ the orthopœdic ladder, the parallel bars, and other machinery, in succession. By the twentieth lesson they were exercised in wrestling, and afterwards in running, special exercises being devised for the lame. From the first lesson the children became fired with emulation, and movements which seemed impossible were soon executed with ease and pleasure. A marked amelioration was speedily observed, their countenances becoming animated, their flesh firm, their voices stronger, their appetites keener and more regular; glandular swellings which had long resisted all treatment, were resolved, and fistulous sores, that had been open for years, closed up. The lessons, one hour each, were given three times a week; and in the intervals the children amused themselves by repeating such of them as did not require machinery." This treatment, at first applied to scrofulous children, was, as stated above, extended to those laboring under nervous affections, partial paralysis, rickets, and especially chorea. Since 1847, ninety-five children suffering from chorea, sometimes so obstinate as to have resisted the most various treatment, have been cured by this means alone, or in conjunction with others, and no accident has resulted from the employment of the exercises. The movements are graduated according to the severity of the case, and they are repeated daily, but not for more than from fifteen to twenty-five minutes, so as not to induce fatigue or palpitation. "Improvement is sometimes seen after the first lesson, and at latest after the fifth or sixth; so that at the end of a week we can judge whether the means are likely to prove efficacious, and if manifest improvement has not then taken place, it is doubtful whether the cure will be thus effected, or if it is, it will be so only after a long time. The worst as well as the slightest cases have reaped equal benefit, the cure in the favorable ones only requiring a mean of twenty-nine days, and old or relapsed chorea being more amenable than recent. Dr. Sée has found that when other remedies are conjoined with the gymnastics, the proportion of cures is less, and the period of their attainment later; and he recommends no other adjunct to be employed than good diet." (Dr. Sée on Chorea, *Loc. cit.* No. 16, p. 50.)

HYGIENIC TREATMENT.—The management of the hygiene of the patient is quite as important as any other part of the treatment. The diet should be arranged to suit the particular condition of the individual, and with a view to procure and maintain the most healthful possible state of the digestive apparatus. It should always be light and easily digestible, in order that neither the stomach nor bowels may be oppressed and deranged by the products of an imperfect digestion. When the stomach is weak and dyspeptic, the food ought to consist for some days chiefly of preparations of milk and bread, whilst in the mean time, a tonic remedy is administered internally, in order to invigorate the power of that organ. As the digestive function becomes stronger, the child ought, as a general rule, to be put upon the kind of diet most likely to promote the general health and vigor of body. It ought to consist of bread, milk, plain wholesome meats, and simple vegetables. Coffee and tea, and all other nervous stimulants, had better be avoided. The meats ought to be mutton, beef, or poultry. There are few vegetables, besides rice and potatoes, which are suitable under the circumstances. All candies, preserves, unripe, coarse, or dried fruit, hot bread and cakes, except the very simplest, ought to be withheld.

Of dress I need merely say that it must be suited to the season. Exercise, or at least, exposure to fresh air and insolation, are of the utmost consequence. When the disease is so violent as to prevent the child from walking, it ought to be taken to drive as often as possible. In cases which seem connected with a debilitated and anemical condition of the constitution, removal to the country, and particularly to the seaside, will often effect a cure with great rapidity. Whenever, indeed, a patient inhabiting a large city or town can be conveniently taken to the seaside in the summer, it ought to be done, for the change is useful not only at the time, but it lessens, also, by strengthening and invigorating the constitution for the future, the danger of a relapse.

CLASS IV.

ERUPTIVE FEVERS.

ARTICLE I.

SCARLET FEVER OR SCARLATINA.

Definition; Frequency; Forms.—Scarlet fever is an epidemic and contagious exantheme, characterized by continued fever; by a scarlet rash, which, appearing on the first or second day of the disease, ends usually about the sixth or seventh, or in rare cases as late as the tenth, and is followed by desquamation; and by simultaneous inflammation of the tonsils, and of the mucous membrane of the mouth and pharynx.

The *frequency* of the disease is exceedingly variable in different years, because of its epidemic nature. I find by reference to the tables of mortality of this city, published by Dr. G. Emerson (*Am. Jour. Med. Sciences*, vol. i, 1827), that in the twenty years from 1807 to 1827, there were 93 deaths from the disease under twenty years of age. In thirteen of these years, from 1 to 8 deaths occurred per annum; in five successive years, 1812 to 1817, not a single death is reported, while in the two remaining years, 1820 and 1821, the deaths were 30 in the former, and 13 in the latter. In another communication to the same Journal (November, 1831), Dr. E. gives the mortality from the disease under twenty years of age, during the four years from 1827 to 1830, inclusive. In 1827 there was one death; in 1828 none; in 1829 nine; and in 1830 forty. During the five years from 1844 to 1848, inclusive, there occurred in this city 1175 deaths from the disease under consideration; of these 262 were in 1844, 191 in 1845, 216 in 1846, 339 in 1847, and 167 in 1848.

It is, I believe, a decidedly less frequent disease on the whole than measles, though when short periods of time are taken, the deaths from scarlatina sometimes preponderate. MM. Guersant and Blache (*Dict. de Méd.* t. 28, p. 173) state that it is less frequent than measles or variola. They added together the cases of the eruptive fevers collected in 1838 and 1839, by MM. Roger, Rilliet and Barthez, and Barrier, in the Children's Hospital at Paris, and found that there had been only 157 of scarlet fever, whilst there were 267 of measles, and 213 of variola and varioloid.

It appears from Dr. Emerson's paper that in the period of twenty years referred to, there were only 93 deaths from scarlet fever, whilst there were 654 from measles, under twenty years of age.

To show how uncertain the proportion is, however, I will state the fact that in the five years from 1844 to 1848, inclusive, 1175 deaths occurred in this city from scarlet fever, while, during the same period, only 311 were caused by measles.

The *forms* of the disease generally enumerated are the *simple*, *anginose*, and *malignant*. Authors differ widely in their descriptions of these three forms. Most of the English authors include in the simple form only the cases in which there is no affection of the fauces, while the anginose form includes all in which there is any throat-affection whatever. M. Rayer, on the contrary, describes under the head of the simple form the cases in which the throat-affection is mild, while he considers the anginose form to be that in which a pseudo-membranous angina occurs. Again, the descriptions of the malignant form are vague and uncertain, some including under this term only the rapidly fatal cases in which cerebral symptoms are present, while others include those also which are rendered malignant by the occurrence of pseudo-membranous angina.

I believe this division of scarlet fever into distinct forms and varieties to be, for several reasons, a faulty arrangement. It is not, it appears to me, in the first place, consonant with the nature of the disease. Scarlet fever is, in fact, with all its degrees of severity, and apparent differences, a single and distinct fever, produced by one cause, determining similar effects, howsoever much they may vary in degree, and requiring no more than does typhoid fever to be divided into the variety of different forms, which it has been customary to ascribe to it. Again, the above mode of division is not, I am sure, a good one for practical purposes. It is impossible, indeed, as I have often found it, to refer many cases we meet with in practice, clearly and satisfactorily to any one of the forms of the disease described in books. The simple form of the English writers, or that in which there is no anginose affection, has no existence whatever, so far as I have been able to discover. I believe that inflammation of the mucous membrane of the fauces constitutes an essential element of the disease; for I have never yet seen a case of scarlatina in which it was not present to a greater or less extent. It is often very slight, so slight, indeed, as to be unaccompanied by any evidence of pain in the part, but in all that I have examined, it has been decided and obvious. This supposed form of the disease does not, therefore, in my opinion, exist.

The two other forms usually described, the anginose and malignant, are also of little value practically, since I have found that in all severe or grave cases, in which the patient did not die with violent nervous symptoms under the first shock of the scarlatinous poison, there has been developed a severe and dangerous anginose inflammation about the third or fourth day; so that it is fair to say that I cannot imagine any malignant case, lasting over the third or fourth day, which is not anginose, nor any severe anginose case, which might not also be styled, from its dangerous character, malignant. I have found it impossible, in my experience, to draw the distinction clearly and indubitably between the anginose and malignant varieties, because all severe cases partake more or less of the features of both.

Feeling this difficulty of describing the disease according to the mode that has hitherto been generally followed, and believing it also to be insufficient for practical purposes, I was led to attempt, in the first edition of this work, a different arrangement.

I made, accordingly, two forms or degrees of the disease, which I designated by the terms *regular* and *grave.* In the first form or degree I included all the cases in which the angina was simple and the eruption regular in all respects; in which there was no predominance of one set of symptoms over another, but in which all held a due relation to each other. In this form was embraced all the cases of scarlatina simplex of writers, and many of those of scarlatina anginosa of the English authors. In the second form I included the cases which departed from the regular course of the disease, and which were rendered dangerous by the occurrence of severe symptoms not belonging in the same degree to the simple affection. This form I subdivided into two varieties, the *grave anginose,* which contained all the cases accompanied by pseudo-membranous, ulcerative, or gangrenous angina; and the *grave cerebral,* which comprised all those marked by the early occurrence of dangerous cerebral symptoms. The grave form comprehended, therefore, some of the cases of scarlatina anginosa, and all those of scarlatina maligna of writers, dividing, however, those in which a pseudo-membranous, ulcerative, or gangrenous angina, determined the types of the attack, from those in which the cerebral or nervous symptoms gave to the case its stamp.

More extended observation and more patient reflection have taught me that this division also is incorrect,—that it does not afford a good classification for the purposes of description, and that it is defective as a guide in practice.

I have determined, therefore, to adopt, in the present edition, a different method of considering the disease, one which I believe to be more consistent with its nature, more suitable for the purposes of description, and much more likely to prove useful in practice. I shall follow the same arrangement in regard to scarlet fever as that now generally employed for typhoid fever. I shall consider it as a single and distinct disease, and not as made up of a number of uncertain and imperfectly separated forms or varieties, all of which so run into each other, as to make it absolutely impossible to draw the line clearly and palpably between them. The only division I shall make will be into *mild* and *grave* cases, since the only real difference between the cases is a difference in the degree of severity they exhibit.

CAUSES.—It has been abundantly proved by long and reiterated observation that scarlatina is propagated by two causes, *contagion*, and *epidemic* influence. Of these two modes of propagation, I have not the least doubt myself that the latter is by far the most active. It is only necessary to look over the results afforded by the tables of mortality for this city, as quoted in the early part of this article, and to observe that in some years the disease caused a heavy mortality, in others a very small one, and that in others again not a single death from it is reported, to be convinced that it is of a highly *epidemic* nature.

The *contagious* character of scarlatina has been doubted by some few persons, but seems to me clearly proved by the evidence adduced by various writers. My own experience also convinces me that it is a contagious disease, though much less so, I am sure, than either small-pox, measles, hooping-cough, or chicken-pox. I have quite frequently, indeed, known children exposed directly and for a considerable length of time to the infection to escape entirely, while it is extremely rare for me to meet with children, unprotected by previous attacks, who can resist the contagion of measles, hooping-cough, or varicella. But, though I believe it to be much less highly contagious than has been generally supposed, and than the other contagious diseases just named, I am also well convinced, as was stated above, that it is propagated to a considerable extent by a direct contagion. I have, in a number of instances, known one child in a family to contract the disease from direct exposure to it, or from the epidemic constitution of the atmosphere, and a second, third, and even a fourth, to take the disease from the first, in five, seven, or nine days after the latter had fallen sick. In other instances, on the contrary, it would seem that either several children in one family contract the disease nearly simultaneously from the epidemic influence, or else that the period of incubation is sometimes very short. For example, during the winter season, a child five months old, who had never been out of the house, was seized with it. On the second day after the eruption appeared on this child, her sister, between four and five years old, fell sick, and on the third day another sister, the only remaining child, between two and three years of age. In the first of these cases it must have been contracted through the epidemic influence which was at that time prevalent in the city, since the child had in no way been directly exposed to it. In the other two, we must either suppose the cause to have been the same, or else that the period of incubation was only two and three days in the respective cases.

The period of incubation is shorter than in other contagious eruptive diseases. It may be stated to vary between two or three days, and two or three weeks. MM. Guersant and Blache are of opinion that in the majority of cases, it is from three to seven days. MM. Rilliet and Barthez found that of 38 cases in which the time was recorded, it was between 2 and 7 days in 16, between 8 and 13 in 15, and 15 and 40 in 8 cases. My own observation would fix it at from 9 to 15 days in the majority of cases.

It is impossible to state with any certainty the length of time during which the power of imparting the contagion continues in the patient. M. Cazenave (*Abrégé Prat. des Mal. de la Peau*, p. 54), states that it lasts throughout the period of desquamation, and that it would even seem to be most active at that time.

The epidemics of scarlet fever vary exceedingly in their extent and violence. During the years 1841 and 1842, the disease prevailed very extensively in this city, and assumed a malignant type, so that in a considerable number of families, two, three, and even four children, died within a very short period.

During the winter of 1856–7, and throughout the spring of 1857, we had one of the most prevalent epidemics that ever visited this city, and yet the proportion of deaths to the whole number of cases in my own practice and that of my friends, was such as to seem to show that the type of the epidemic was mild.

The disease prevails at all seasons, but is most frequent in the spring and summer, and next in the autumn. It rarely occurs more than once in the same individual, but that it does so sometimes is proved by facts brought forward by different authors. It has been asserted that second attacks of scarlet fever occur in the same person not more than once in a thousand cases. Of the truth of this assertion I am, however, very doubtful, since it has occurred to me to see no less than three examples of second attacks in my own short experience. I attended in this city one child with perfectly well-marked scarlet fever, attested by subsequent anasarca, who had had the disease two years previously under the care of my father, Prof. C. D. Meigs. In the winter of 1852, I attended two children in one family with the disease, one of whom died, and both of whom had had the disease four years and a half before. They were attended in the first attack by myself, and as it chanced, owing to my absence from town during one day, they were seen also by one of my friends, who made no exception whatever to the diagnosis of scarlet fever. The only doubt as to these cases having been veritable examples of double attacks of the disease, must rest of course upon the diagnosis. In the first example the diagnosis was made by my father in the first attack, and by myself in the second. In the two latter it was made by myself in both, accidentally confirmed in the first attack, in both children, by the opinion of a competent professional friend. The first attacks in the latter cases were both mild, but well marked; the second were both severe, and one proved fatal on the sixth day. I have not the least doubt myself that all of the three were cases of true scarlet fever. If they were not, the two latter must have been cases of roseola, so closely resembling scarlatina as to oblige me to confess myself incompetent to distinguish between the two diseases. What adds to the certainty that the two which came under my own observation were examples of scarlet fever, is the fact they occurred simultaneously with a third case in the same family. Now, roseola is not apt, so far as I know, to occur epidemically in a household. Most of the cases of that disease that I have seen have been solitary ones. Again, in the spring of this year (1857), I have seen a well-marked attack of the disease in a boy nearly four years old, who had it one year before, under the charge of a perfectly competent practitioner.

Age.—MM. Rilliet and Barthez state that it is most common from six to ten years of age. Of 251 cases that I have seen, in which the age was noted, 64 occurred under 3 years of age, 78 between 3 and 5 years, 51 between 5 and 7, 47 between 7 and 10, and 11 between 10 and 15. From this it would appear to be more common in the first five years than between the ages of five and ten, since of the 251 cases, 142 occurred in the former, and only 98 in the latter period. By uniting the statistical tables of Dr. Emerson with those of Dr. Condie (*Dis. of Child.* 2d ed. note, p. 86), I obtain the deaths from scarlatina in this city at different ages for a period of thirty years. Their tables show clearly that the disease is most common between the ages of one and five years. The total mortality under ten years, during the time stated, was 2171, of which 132 were under one year of age, 411 between one and two, 1130 between two and five, and 510 between five and ten.

The earliest age at which I have seen it perfectly well marked, was twenty-one days. I saw it once also in a child five months of age, and twice at the age of six months. It is not nearly so common in the first year of life as it is afterwards. The largest number of cases occur, according to my experience, in the third, fourth, and fifth years of life.

The influence of *sex* seems not to have been determined with certainty. Dr. Tweedie (*Cyclop. of Pract. Med.* Art. Scarlatina) says it is most common in girls. MM. Rilliet and Barthez, on the contrary, state it to be more common in boys. Of 262 cases under 15 years of age that I have seen, in which the sex was noted, 133 occurred in males, and 129 in females. The truth is probably that under puberty it attacks the two sexes with about equal frequency, while after that age it is most common in females.

SYMPTOMS; COURSE; DURATION.—As has already been stated, I intend, in my description of the symptoms of scarlet fever, to depart from the ordinary mode of arrangement of the subject. I shall discard the old division of the disease into three forms or degrees, scarlatina simplex, anginosa, and maligna, and substitute, for reasons already given, the simple division into mild and grave cases. I shall class as mild cases those which pursue an even and regular course, without being accompanied by dangerous or malignant symptoms, in which there occur neither violent nervous, nor threatening anginose symptoms; while among the grave cases I shall place those in which there occur severe nervous symptoms, in the form of violent delirium, coma, or convulsions, dangerous symptoms in the form of diphtheritic, ulcerative, or gangrenous inflammation of the mucous membrane of the fauces, and, finally, those in which the general symptoms assume a low and typhous character. When it seems convenient, I shall follow the usual division of the course of the disease into the three stages of invasion, eruption, and desquamation.

Mild cases.—Stage of Invasion.—The following description of the symptoms of scarlet fever in its mild form is drawn partly from books, but much more from my own observation of 206 mild cases of the disease, of all of which I have kept a faithful record, and when there was anything peculiar or important, full notes.

The onset of mild cases of scarlet fever is generally sudden. A child is well, or so slightly ailing, on one day, as that the change from its usual condition is not noticed at the time though it may be recollected afterwards, and on the following day, or often within twelve hours or even less, the symptoms of the disease become marked and characteristic. In a large majority of the cases that I have seen, the eruption is already visible at my first visit. Frequently the patient has been put to bed well in the evening, and, becoming restless and feverish in the night, is found on the following morning with fever, sore throat, and very considerable eruption; or, as happened in one of my cases, a child gets up in the morning apparently well, breakfasts as usual, goes to church, and falling sick while there, comes home and a few hours later shows the eruption over the neck and upper part of the trunk, and has fever and sore throat. In another case, a boy between seven and eight years old was perfectly well in the morning. At 2 P. M., his mother, a most sensible and accurate person, observed him playing in the garden, and remarked upon his healthy looks. Fifteen minutes after this he felt sick at his stomach; he came into the house and went up to the nursery, looking pale and pinched, with a cold skin, and nearly fainted in the nurse's arms. He had then in the course of an hour three copious and watery stools, each one accompanied with vomiting. I saw him one hour after this, dozing, very pale, with pinched features, sunken and half-closed eyes, cool surface, and with the pulse at 128, and rather feeble. There was no eruption. At 6 P. M. I found him with a hot and dry skin, with the tongue heavily coated, the fauces swollen and showing flecks of exudation upon the tonsils, a pulse at 128, and with a well-marked scarlatinous eruption coming out abundantly. The case pursued a very regular course, without dangerous or malignant symptoms of any kind.

But the invasion, though sudden in nearly all cases, is not always so precipitate as I have just described. When we come to analyze the early symptoms we find that the first one observed in most of the cases is fever, marked by considerable acceleration of the pulse and heat of skin. In some few cases the fever is preceded by the ordinary prodromes of febrile diseases, languor, lassitude, pains in the back and limbs, and slight rigors. Simultaneously with the fever, there is, in nearly all cases, more or less soreness of the throat. In all that I have examined, even those in which no pain was complained of, there has been redness, or redness with swelling of the fauces. In a majority of the cases vomiting occurs, or if not vomiting, some degree of nausea. There is complete anorexia; the thirst is acute; the bowels are usually in their natural condition, or slightly constipated. The child is quiet and dull, or else restless and irritable, and sometimes there is delirium; the face is generally flushed, and the eyes often slightly injected. The duration of these symptoms is irregular. They are said to last generally about a day, but they may continue either a shorter or longer period. I am very sure, from my own observation, as I have already stated, that these preparatory symptoms rarely precede the eruption more than twelve hours, and very often the time is even less.

Stage of Eruption.—The eruption generally appears first on the face and neck, whence it extends rapidly over the whole surface. It continues to increase in extent and intensity, so as to reach its maximum about the third or fourth day. It appears first in minute dark-red points dotted upon a rose-colored surface, forming patches of irregular shape, of considerable size, level with the skin, disappearing under pressure, divided at first by portions of healthy skin, but running rapidly together, and giving to large portions of the surface a uniform scarlet color. The eruption is not generally equally diffused over the whole body, but is more marked upon one portion than another. It is often most intense on the back, and is there of a deeper color than elsewhere, not unfrequently assuming a purple hue. It is generally very well marked on the abdomen and thighs, and about the articulations, and assumes in those regions a particularly bright tint.

It does not always cover the whole surface, but in some very mild cases, and, as we shall find when treating of the grave cases, in these latter, also, it may occur only in patches of moderate extent upon different portions of the body, leaving us at times in some doubt as to the real nature of the rash.

The surface of the eruption is smooth and even to the touch, unless, as not unfrequently happens, it is accompanied by the development of miliary vesicles, or crops of minute pimples, or pustules. A certain degree of roughness is sometimes occasioned also by enlargement of the papillæ of the skin in various parts of the body, particularly on the extensor surface of the limbs; but these are evidently independent of the characteristic eruption. The skin upon some parts of the body, especially the face, hands, and feet, often presents a swollen appearance, rendering the move[illegible]ts somewhat stiff. There is in most cases a feeling of burning, irritation, and itching in the skin, the latter of which symptoms increases as the malady progresses.

The eruption generally reaches its height about the fourth day, and then remains stationary for one, or less frequently two days, after which it begins to decline. Its decline is marked by a diminution in the intensity of the color, which, from scarlet becomes red, then rose-colored, and growing paler and paler, finally disappears entirely about the sixth, seventh, or eighth day. In some very mild cases, however, the whole duration of the eruption is not over two or three days, and in such the color it imparts to the skin is never very bright nor very deep, nor is it accompanied by intense heat, or by much irritation or itching.

The symptoms which preceded the eruption do not subside on its appearance, but persist or are augmented. The febrile movement continues unabated; the pulse is full, strong, and frequent, running up very soon after the onset to 120, 140, 150, and often to 160. This frequency of the pulse is, in fact, one of the most marked symptoms of the disease. I have rarely, even in very mild cases, found it less than 140, and in not a few it has been in the first few days, and in children of four or six years old even, as high as 168 or 170. Occasionally, however, it has been lower, and in one case that occurred to me lately, in a boy five years old, it was 96 on the second day, and only 88 on the third, though there was still a good deal of rash upon the skin. The skin is burning hot and dry, as a general rule, and loses its usual softness and suppleness. The expression of the face is usually natural. The eye is often animated, and slightly injected. The respiration is generally easy and natural, though sometimes when the fever is violent, it becomes quickened. The auscultation and percussion signs are natural, unless some complication exists. There is often a rather frequent cough, which is dry, and evidently depends on the guttural inflammation, and not on any bronchial or pulmonary affection; it exists during the early period of the eruption, and declines with the inflammation of the fauces. The voice is seldom altered beyond having a nasal sound, so long as the disease continues simple and regular. If the voice becomes hoarse or whispering, it indicates an extension of inflammation from the pharynx to the larynx. The anorexia continues until the eruption begins to decline, and the thirst is acute up to the same period, when it moderates. At first the dorsum of the tongue is covered with a whitish or yellowish-white fur of variable thickness, while its tip and edges are of a deep red color. After two or three days, and during the course of the eruption, the coating just described disappears from the tongue, and its whole surface assumes a deep red tint and a shining appearance, which makes it look like raw flesh. At the same time it is often much diminished in size from contraction of its tissues, and its papillæ become enlarged and projecting; this condition generally lasts from six to ten days; after which it returns to its natural state; it is commonly moist throughout the attack. Vomiting is rarely troublesome in mild cases, though it often occurs; the bowels continue nearly in their natural condition; in some few cases slight diarrhœa occurs, but more frequently there is very moderate constipation which requires the use of mild laxatives. The abdomen is natural in most of the cases: sometimes, however, there is slight tension and pain for a few days, which coincide generally with enlargement of the liver, or more rarely of the spleen. The urinary secretion is usually more or less reddened as in other febrile diseases.

Early in the second, or even in the first stage, the fauces present the signs of inflammatory action; the pharynx is reddened, and in some instances swelled; the tonsils enlarge and become red; the submaxillary and lymphatic glands are somewhat tumefied and tender to the touch, and when the case is at all severe, deglutition is generally painful, and in some instances extremely so. The absence of complaints of sore throat in a child, or the fact of its swallowing without hesitation or apparent difficulty, is no proof that angina does not exist, since I have always found upon examination in a good light much greater redness than natural, and in many instances redness and swelling combined. As the eruption progresses, and the tongue loses its coat and becomes red, the inflammation of the pharynx usually augments; the redness becomes deeper, and the tonsils are more swelled and painful, and in a good many, but not by any means all the cases, dotted over with small white spots, or with thin, whitish, and soft false membranes. The throat-affection, however, is rarely severe enough to constitute a serious danger in mild scarlatina, while in many of the malignant cases, it is a frequent cause of a fatal termination. During the eruption, the nostrils are either dry and incrusted, or there is some coryza. The strength of the child is reduced for the time, but there are no signs of prostration, and the decubitus is indifferent. There is almost always more or less disorder of the nervous system, sometimes amounting only to headache and restlessness, while in other instances there is great irritability, wakefulness, and occasional delirium, especially at night.

Stage of Decline and Desquamation.—The eruption reaches its height, as already stated, about the third or fourth day, then remains stationary for one or two days, and afterwards declines gradually, so that no traces are left on the sixth, usually, or at most in rare cases, on the ninth or tenth day. In some very mild attacks, the whole duration of the eruption is not over two or three days. By the third day it has disappeared entirely. Such cases are not, however, very common. The other symptoms, both general and local, decline with the eruption; the pulse loses its frequency, and falls to the natural standard; the heat of the surface first subsides and then disappears, but the skin remains somewhat harsh; the redness and swelling of the tonsils and pharynx diminish; the spots of false membrane, if these be present, are absorbed or thrown off; the deglutition becomes easy if it have been difficult, and soon all signs of throat-affection vanish; the tongue cleans off, becomes reddish and glossy, and after a time returns to its natural state.

At the time that the subsidence of all the symptoms takes place, *desquamation* begins. It dates therefore in most cases from about the sixth day, though it may be either earlier or later. It commences in most of the cases on the face and neck, though in a few instances it appears first on the abdomen. It then extends gradually over the body and becomes general. About the thorax and abdomen it occurs in the form of minute points, like those which result from the desiccation of sudamina; on the face it is in the form of thin light scales or squamæ, while on the extremities large flakes of the epidermis become separated from the derm, and are removed by the child, or rubbed off by his movements in bed; these flakes are sometimes so large on the hands and feet as to form complete moulds of the fingers and toes, or even of the hands and feet. The whole process usually occupies some ten or twelve days, but may be prolonged even into the third week. It is generally accompanied by roughness and dryness, and some itching and irritation of the skin. Not unfrequently, the surface beneath the exfoliation is left tender and irritable for some time afterwards.

Before quitting this part of my subject, I must remark that, though the above is a correct description of the usual symptoms of mild cases of this disease, the reader would be greatly deceived should he expect always, and invariably, to find this exact train of morbid phenomena. On the contrary, the mild and the grave cases both vary so much, that it is impossible to describe them accurately by one or two portraits. Taking the above sketch as a standard of the mild cases, the observer will find that many fall short of it in all their features, while others deepen gradually in their shades, so to speak, until they pass into the grave type. Those that are milder in their type than the above sketch, may be so in such a degree as to make it very difficult, and in some cases impossible, to determine positively whether the child has had the disease or not. Indeed, I doubt not myself that children sometimes have the disease so slightly, that it is not discovered by either the physician or parents, and, being protected by the attack, are in after life classed amongst those insusceptible to the disease. My grounds for asserting this are the facts that some cases I have seen have been so very mild that, but for the existence of the disease amongst other members of the family, they might have passed unobserved; and that in one instance I was sent for to see a patient, who had had the eruption for three days, and yet who was so slightly sick that he was sent for from school, to which he had gone, for me to see. It was a well-marked case, and the child had no troublesome symptoms afterwards, notwithstanding the exposure he had undergone.

Grave cases.—The following description of the symptoms of grave cases of scarlet fever is, like that which has just been given of the mild cases, drawn partly from books, and partly from my own observation of the disease. My own experience includes the careful observation, and a more or less full notation, of 57 grave cases. I shall include under this division of the subject, as already stated, most of the cases usually classed by writers under the title of scarlatina anginosa, and all those generally described under the title of scarlatina maligna.

The symptoms which mark the *invasion* of grave cases of scarlet fever, though sufficiently alike in all to show the unity of the disease, differ very materially as to their degree of severity in different cases. In one set (rather less than a third, or 16 in 57, of my cases), they are most violent and dangerous, or, indeed, appalling in their character. From the first, they declare the imminent danger of the attack. In the second set (rather more than two-thirds, or 41 in 57, of my cases), they may be either evidently severe and dangerous, though not appalling as in the first, or they may be much milder, more like those which mark the invasion of mild cases, but even under these circumstances they soon put on their grave and dangerous character.

The first set of cases, or those in which the symptoms are the most severe of all, usually begin with nervous symptoms. The onset is in some instantaneous. In one, the little patient, a girl two years old, whose brother and sister had been sick for some days with scarlatina, was put to bed in the evening in her usual health, which was strong and vigorous. She slept quietly through the night, but was found by the mother the next morning in a state of drowsiness, violent fever, and covered with a deep-red scarlatinous rash. She soon became comatose, and died on the third day. In another case, a boy eleven months old was a little fretful in the afternoon, but was put to bed in the evening as usual and went to sleep. About ten o'clock the nurse heard a rustling in the bed, and on going to it, found him in a violent general convulsion. The next morning he was covered with a scarlet rash, which became deeper and deeper as the disease went on. On the second day he was nearly insensible, and had frequent attacks of convulsions; on the third day he had retraction of the neck, with spasmodic twitchings, and at the end of that day, died in a state of coma. In a third case, a boy six years old, whose sister had been sick for a week with a mild attack, went to bed well. At three o'clock in the morning, he was seized with vomiting and purging, paleness and coolness of the skin, and great exhaustion. At nine o'clock he was drowsy and dull, the skin was pale and cool, and the pulse extremely rapid; the vomiting and purging had ceased; at 12 M. he was comatose and had a convulsion. From this time he continued comatose until he died at 6 P. M. of the same day, after an illness of fifteen hours. In a fourth instance, the invasion was that of croup; after a few hours came on coma and convulsions; patches of eruption then appeared on the trunk, and death occurred in twenty-four hours from the beginning. The subject of this case, a boy five years old, was thought to be so well in the afternoon of the day he was taken sick, that he had been sent out to visit a relation, and while there fell sick. In the fifth case the onset was sudden, with violent fever, drowsiness, deep suffusion of the skin, and in a few hours insensibility, general convulsions, and death in thirty-six hours. In a sixth, in a boy four years old, the attack came on with vomiting, paleness, drowsiness, and then a scarlet rash; after a few days, coryza and otorrhœa occurred; the tongue and lips became cracked and dry; in the second week, the child was comatose, with occasional attacks of extreme jactitation, and the most violent hydrocephalic cries, which condition lasted ten days. After this there was diarrhœa, extreme emaciation, loss of speech, and entire deafness. Gradually, however, the fever disappeared, the tongue cleaned off, and intelligence very slowly returned; in the sixth week convalescence was firmly established, and the child recovered perfectly with the exception of his hearing, which remained very dull in consequence of the perforation of both membranæ tympanorum. In a seventh, a girl eight years old, whose brother was then sick in the house with the disease, was in the morning well. At breakfast she said she felt sick and soon went to bed. At 5 P. M. of that day, she was attacked with a general convulsion which lasted about fifteen minutes. The pulse, immediately after the convulsion, was 150. At 11 P. M. she had another convulsion. Through that night, she was very restless and wandering. On the morning of the second day, there was a third convulsion, which, however, was very short. The pulse was now 160, small, and feeble. The patient was very heavy and dull, answering questions slowly, and with great difficulty, and during part of the day she was comatose. On the third day, she was better, the pulse having fallen to 152, and she was less dull, though she still continued very heavy and inattentive unless aroused by persevering efforts. The limbs were cool, while the head and trunk were hot. The eruption was thick on the trunk and upper part of the extremities; elsewhere it was scanty. Wherever it existed, it was of a deep red or purplish color, and the capillary circulation was sluggish and imperfect. On the fourth day, her intellectual condition continued better, but the extremities were still cold, and the lymphatic glands and subcutaneous tissues about the lower jaw and neck had begun to swell. On the fifth day, the swelling had become very great; the stupor had returned; a profuse and disgusting coryza and otorrhœa had set in; and the edges of the eyelids were inflamed and sore. On the sixth day the discharges from the mucous membranes of the head were very copious, and consisted of a thick, offensive, purulent fluid, intermixed with dull whitish grumous particles. The patient was now comatose or very restless; she swallowed with great difficulty; the swelling about the lower jaw and under the throat was enormous; the pulse was rapid and small; the eruption was very dark in tint; the cutaneous circulation was slow; the extremities were cold, and death occurred about the middle of this day. In another case, the subject of which was a girl between three and four years old, the attack began with severe inflammation of the throat, causing great difficulty in swallowing. The rash on the first day was very extensive and of a deep red color. The child was drowsy and heavy, or else delirious. On the second day, she was comatose, and had strabismus and automatic movements of the limbs. On the third day the coma continued, and there were automatic movements of the extensor muscles, with retraction of the head. The eruption continued vivid, but was of a dark red color. Death occurred in the middle of the fourth day, in a state of coma, without convulsions. In still another case, a boy, between eight and nine years old, was attacked suddenly, while in good health, with vomiting, sore throat, and high fever. Twelve hours after the onset, he had a severe convulsion, which lasted fifteen minutes. He soon recovered from this, however, and remained perfectly intelligent. On the second day the rash was moderate; there was violent fever, and the child was heavy, but, when roused, still intelligent. Early in this day a severe fit occurred. This was most violent, as severe as the worst epileptic convulsion. It lasted one hour and three-quarters. The pulse, after this, was 145. On the third and fourth days, the symptoms improved very much, the pulse having fallen to 125 and 132, but he continued drowsy and heavy. The eruption came out most abundantly. The fauces were very much inflamed and somewhat ulcerated, and the external lymphatic glands were enlarged, but still the swallowing was not difficult. On the fifth day he was not so well, being more restless and heavy alternately. There had now come on much difficulty in breathing, and some croupal sound. The latter symptom increased through the day, until the dyspœna became very great. Deglutition now became excessively difficult; the external swelling increased; attacks of suffocation attended with the most painful and distressing jactitation came on, and were renewed more and more frequently; and death occurred by asphyxia about the middle of the sixth day. In a tenth case, in a girl five months old, convulsions occurred on the second day. These were followed by coma lasting several days, and by enormous swelling of the lymphatic glands and subcutaneous tissues on the left side of the neck, and by a less degree of swelling on the right side of the neck. The glands of both sides suppurated and were opened, and the child finally recovered perfectly. In an eleventh case, in a boy seven years old, an attack of general convulsions took place on the third day, after which there were delirium and coma alternately for several days, with coryza, angina, and offensive otorrhœa, lasting in all six weeks. The child recovered, but remained deaf.

In this form of the disease, therefore, the symptoms are of the most virulent character. The onset is sudden. The child passes within a few hours from a state of apparent health, into one of the extremest danger. Most of the cases begin with violent fever, and great depression of the strength. The pulse soon becomes very rapid (140, 150, 180), or so quick that it cannot be counted, and it is at the same time small and often irregular. The skin is dry and burning hot in some parts, in others cool or even cold. There is generally nausea or vomiting, and these may be violent and constant. These are accompanied in some cases, but, in my experience, only in the severest of all, by colliquative diarrhœa and meteorism. Delirium often exists from the first, or else there is drowsiness and dulness of intelligence, verging gradually into coma. In the most violent cases, the stupor or coma alternate with convulsions, which may cause a fatal termination in eighteen, twenty-four, or thirty-six hours.

When a case of this kind lasts over three, or even two days, the violence of the nervous symptoms almost always subsides; the convulsions cease to recur; the delirium is less violent; the coma gives way to drowsiness, or the patient becomes again quite intelligent and observant; the pulse often falls in frequency, and the heat of skin may diminish, and the eruption assume a more favorable appearance. All the symptoms seem, indeed, to be more promising, and very often both the physician and friends are greatly elated by the improvement in the patient's condition. Nor are these hopes always illusory, since children do recover occasionally even in cases that have exhibited the most threatening and malignant appearance at the moment of invasion. It happens, unfortunately, however, in a majority of such attacks, that the improvement which takes place on the third or fourth day is only momentary. The nervous symptoms subside, but new phenomena make their appearance in the shape of severe inflammation, membranous deposit upon, or ulceration of, the fauces, and extensive swelling and induration of the lymphatic glands and subcutaneous tissues about the angles of the inferior jaw, and under the chin and throat. In connection with the throat-affection which develops itself in this way, it is very common to have abundant purulent coryza, and often also otorrhœa. The symptoms assume, in fact, the features of the cases usually described under the title of scarlatina anginosa. As I shall, however, describe them directly in my account of the second set of grave cases, it is unnecessary to pursue the description at the present moment. I will state, however, before proceeding further, that the anginose and general symptoms which occur in cases beginning with violent nervous phenomena, and especially with convulsions, are nearly always of the most dangerous and malignant character, and usually end fatally in two, three, or four days after their appearance.

The eruption in this class of cases varies according to the violence of the attack. In the severest one that I saw, that which proved fatal in fifteen hours, no eruption whatever was perceived, and we only knew it to be scarlatina by the character of the other symptoms, and by the fact that the sister of the boy had been sick in the same house with the disease for a week. In the case which terminated in twenty-four hours, the eruption showed itself in the form of scarlet patches about the face and upper parts of the body, twelve hours after the onset. In a third case the eruption was moderate, but perfectly well marked and general. In the other thirteen cases, which lasted, with one exception, not less than three days, the eruption was perfectly well marked. It covered the whole surface, was at first scarlet in color, soon ran into a deep red, and then became violet or purplish. The exceptional case was one which lasted thirty-six hours, and proved fatal in that time. In this also, the eruption was well marked and extensive. M. Gueretin (*Arch. de Méd.* t. i, p. 292, 1842), in his account of the acute malignant form which he witnessed, states that the eruption was nearly constant. In all my cases it occurred within twenty-four hours from the invasion, while in those of M. Gueretin, it appeared within twenty-four or forty-eight hours, or, as more frequently happened, not until the fourth or fifth day.

If no favorable change takes place in these severe cases, and when they do not prove fatal at once, the patient grows weaker and weaker; the delirium continues, or is replaced by coma; subsultus tendinum, rigidity of the limbs, spasmodic twitchings or general convulsions, make their appearance; the eruption becomes more and more livid; the pulse grows smaller, more frequent, and irregular; the respiration is excessively embarrassed; deglutition becomes impossible; and the patient dies in from three to seven or nine days. In some few instances the child struggles on for several weeks, and dies in a state of utter exhaustion, or, having a constitution of great powers of endurance, at last surmounts the disease and recovers.

The invasion of grave cases is not always, as I have stated above, so violent as in those which have just been described. In rather more than two-thirds (41) of the 57 grave cases that I have seen, the onset was less threatening than in the other third, though the symptoms were severe and dangerous in most of these also, and when not so at the very start, very soon assumed the serious characters which make it necessary to class the cases in which they occurred as grave. The chief difference between the symptoms that mark the onset of grave cases of this kind, and of those in which the symptoms are still more violent, which latter I have thus far been describing, lies in the character of the nervous phenomena,—in the latter most severe threatening, and dangerous, consisting of stupor, coma, or convulsions, and in the former, merely excessive agitation, restlessness, heaviness, or stupor. In one well-marked case of the kind now under consideration, the patient, a boy between seven and eight years old, was attacked in the evening with headache, fever, and vomiting. On the following morning a faint rash was perceptible, which, by the afternoon of that day was distinct, though not very full. The case now rapidly assumed unpleasant features. The pulse rose to 150. There was much drowsiness and delirium, and on the fourth day constant picking at the bed-clothes and at the fingers. In another case, in a boy between four and five years old, the first sign of sickness was slight languor after dinner, which was followed by fever in the evening, and the development in the course of the night of a scarlatinous rash. On the following day, there was some pain in the throat, with redness; the pulse was 140, and the skin hot and dry; there were no nervous symptoms, except slight drowsiness. On the third day the pulse was 136, the rash was well out, and there was no unpleasant symptoms whatever. From this time, however, the symptoms gradually grew worse;—the throat-affection increasing, the cervical lymphatic glands becoming very much swelled, and the child growing more uneasy and restless, though retaining perfectly its intelligence. By the sixth day, the grave character of the case was fully developed, the eruption being intense, and of a deep brick-red, verging towards a purple color. There was at the same time very great drowsiness, abundant discharges from the nasal passages of thick sero-mucous and purulent fluids, membranous exudation in the fauces, with gurgling and great difficulty in swallowing, and an utter loss of appetite. In a third case, a boy between one and two years old was a little fretful in the morning, and was seized in the evening with vomiting and fever, and very considerable restlessness. On the next day he was covered with a scarlet rash from head to foot, and the skin was fiery hot. The pulse was 160, regular, not large. The child was very drowsy, dozing nearly all the time, but quite intelligent when aroused. The fauces were intensely red and rough and the tonsils much swelled; there was very little external swelling. On the third day he was still very drowsy, and when roused less observant than before, though he still recognized persons. The pulse was 168, small, difficult to count, very hard, and corded. The skin, especially that of the limbs, was scarlet, very hot, and dry; the cutaneous capillary circulation was good. After this the symptoms grew rapidly worse; the pulse continued at from 148 to 168 on the fourth and fifth days, and on the sixth rose to 172, at which it stood a few hours before death. On the fourth and fifth days, he was still very heavy and drowsy, and so much so on the former as to take no notice whatever except when moved. On the fifth day, an abundant sero-mucous discharge took place from the nostrils; the cervical lymphatic glands, which had begun to swell before, now increased in size; there was some loud faucial gurgling, and the swallowing became difficult. On the morning of the sixth day, some of the symptoms improved so much as to flatter very greatly some of his attendants, who were unacquainted with the treacherous character of the disease. He roused up from his state of stupor, and noticed several things that were shown him, even taking them into his hand; but the breathing continued bad, the lymphatic glands were swelling rapidly, and had already become very large, so that they formed great projections on either side of the neck. The pulse was 155, and small. In the middle of the day the breathing became difficult, from the internal and external swelling, and from the collection in the fauces of thick and viscid phlegm. The surface had now become pale. The tumefaction about the neck was immense. Down the front of the neck and along its sides to the clavicles, a kind of œdematous swelling of great size had come on, and was rapidly increasing. The pulse was 160, small, and feeble. The legs and arms were of a dark, congested tint. Deglutition was excessively difficult. In the evening the pulse was 172, and death took place just before midnight with slight convulsive movements.

The mode of invasion is different, therefore, in different examples of the kind of grave cases now under consideration. In some it is even milder than in any of those that have just been detailed, and it is not until the third, fourth, or fifth day, or even later, that the severity of the attack shows itself fully and unmistakably.

After the disease is once established, it will be found upon examination, that the fauces are of a deeper red color, and that they are more swelled, than in mild cases. At the same time there is more difficulty and pain in deglutition; these are complained of by older children, and are shown in those who are younger by their refusal to swallow, by their crying upon making the attempt, and in some instances, especially at a later period of the sickness, by a positive inability to perform the movement. In nearly all of these cases, false membrane is thrown out upon the mucous membrane of the throat. This is never, or very rarely, present on the first day of the attack. In most cases it is not found until the second or third, and often not before the fifth or sixth day. MM. Rilliet and Barthez state that they have known it not to appear until the tenth and eleventh days. It appears first in small, thin, whitish, yellowish, or ash-colored points or patches, on one or both tonsils, or on the soft palate only, where it remains limited, or from whence it extends to the pharynx, which it may cover in whole or in part. The patches are of variable thickness and consistence, and adhere sometimes very slightly, and sometimes with considerable tenacity to the mucous membrane beneath. They may remain for a day, and then be thrown off not to be again produced; or they may form in several successive crops, until the case is terminated; or, as most frequently happens, they last three or four days, or more, and are then detached. The mucous membrane upon which they are seated is found in various conditions. It may present the redness and swelling indicative of severe inflammation, or it may be softened, ulcerated, and according to MM. Guersant and Blache, gangrenous, though, as a general rule, what have been supposed to be sloughs are in fact portions of altered false membrane. There is more or less fœtor of the breath, sometimes amounting to a gangrenous odor, after the appearance of the pseudo-membrane. The severity of the symptoms is in proportion to the extent and thickness of the false membrane.

We have already seen that it is not uncommon to find ulcerations beneath the false membranes. In other cases of this kind the throat-affection assumes very great violence without the presence of any exudation whatever. In some the mucous membrane is of a deep red or even purplish hue, its consistence is softened, and it is swelled, and covered with a layer of grayish or sanious pus. The tonsils are enlarged, infiltrated with pus, softened, and break down easily under the finger. In other cases, in addition to the redness and softening, ulcerations are present. These may be superficial, amounting only to erosions, or they may extend through the mucous, and even submucous tissue, to the muscles beneath. They are seated generally in the pharynx, but may exist also on the tonsils, and in some rare cases they extend into the larynx. In still more malignant attacks of the disease, we find evidences of gangrene of the pharynx. It is important to distinguish between those in which the pseudo-membrane becomes so changed as to assume the appearance of sloughs, and those in which the tissues of the pharynx are really gangrenous. The former constitute by far the greater number of the cases which have been generally regarded as instances of gangrene of the throat. That gangrene of these tissues does actually occur in some few cases, is proved, however, by the evidence of Dr. Tweedie, who says (*Loc. cit.* p. 650), that in malignant scarlatina "the membrane of the pharynx is sometimes of a dark, livid color, and occasionally in a sloughing state," and by that of MM. Guersant and Blache (*Dict. de Méd.* Art. p. 159), who state that they met with several instances of gangrene of the pharynx in the pseudo-membranous angina which prevailed in 1841.

An almost constant accompaniment of cases of this kind is inflammation and swelling of the submaxillary lymphatic glands and surrounding cellular tissue. The tumefaction is generally confined at first to the glands beneath the jaw, which become painful to the touch. After a short time it extends to the parts behind the angle of the jaw, and beneath that bone, until at last the sides of the neck and the throat are largely distended, so as to interfere with or even prevent in great measure, the opening of the mouth, and, by the pressure exerted on the internal parts of the throat, to add to the difficulty of deglutition which already exists. In some cases the pressure is so considerable as to embarrass the respiration of the child. This swelling has been generally supposed to depend on inflammation of the parotid glands; but MM. Bretonneau, Guersant and Blache, and Rilliet and Barthez, all state that parotitis is of exceedingly rare occurrence, and that the swelling in question depends nearly always on the causes just described. The last-named writers state, moreover, that the tumefaction of the cellular tissue is often of the nature of active œdema. The swelling of the cervical lymphatic glands, and of the cellular tissue of the sides of the neck, and that under the throat and chin, seldom takes place to any considerable extent, according to my experience, prior to the third or fourth day. During the first two or three days, the chief symptoms are the fever, the eruption, and the nervous phenomena, which latter consist, in this class of cases, of either excessive agitation and restlessness, or of drowsiness or stupor. Very often, after a child has seemed to be very ill for two, three, or four days, from the violence of the febrile reaction and the severity of the nervous symptoms, it will appear to improve very decidedly on the third or fourth day, and elevate greatly the hopes of those interested in it. It is just at this time, however, that the throat-affection is apt to set in severely, and, moreover, it rarely fails to come in children who have presented violent symptoms during the first three days. The enlargement generally disappears, in favorable cases, in from three to twelve days, by resolution, while in others it terminates by suppuration of the glands and surrounding parts.

In the form of the disease we are now considering, it is common to observe violent *coryza*, which may be either purulent or pseudo-membranous. It may appear from the very first, or not for several days after the eruption has commenced. The discharge is yellowish, granular, thin, very offensive, and highly acrid, so as to excoriate very much the upper lip. It often flows in surprising quantities, and generally continues up to the moment of death, or until all the symptoms have moderated.

Otorrhœa is another symptom of this form. It generally occurs simultaneously with coryza. The discharge is at first thin and watery, like that from the nostrils, but becomes gradually thicker as the case advances. The quantity is extremely variable. In some cases I have known it to fill the meatuses and conchæ of both ears, and then to flow out and make large stains upon the pillow, or to collect very rapidly after being wiped away. It is, like the coryza, an unfavorable symptom, as it is a mark of the grave form of the disease, and because, if the child recovers, it is very apt to result in deafness, which is but too often permanent.

These symptoms, coryza and otorrhœa, sometimes exist also in mild cases, but they do not then assume the peculiar characters which they present in grave cases. The discharges are much less abundant, and the mucus or pus is healthy, and scarcely offensive to the smell; they last but a short time, and are very rarely accompanied at the time, or followed, by more than a slight degree of deafness.

The eruption is generally stated to appear later than in mild cases, and often to be less vivid and less extensive. It is also said to occupy only portions and not the whole of the body, to occur in irregular patches, or to appear and disappear alternately. This has not been the case in the instances which I have seen. In all but two of the forty-one, the eruption occurred early, generally within twenty-four hours from the onset. It was of a deep brick-red or livid color, and covered the whole surface. In one of the exceptional cases it did not take place until the seventh day, when it appeared in patches on the wrists and knees. On the eighth day it extended to the rest of the extremities and abdomen, and on the ninth was general, and of a rather dark hue. In the second exceptional case, the eruption did not appear until the second day. It then came out over the whole trunk, and to a moderate extent upon the limbs also. In this, as in the previous one, it was dark in its tint. In three other cases it was quite moderate in amount, but general and well-marked.

The *general symptoms* are more severe in grave than in mild cases. It sometimes happens that for one or two days, or even longer, the case promises to be mild, but then suddenly assumes the threatening features of the form under consideration. The fever is usually intense, the pulse being full and strong, and rising very soon after the onset to 140, 150, or 170; the skin is very hot and dry; there is more restlessness and irritability than in the mild form, and after one, two, or three days, appears a strong disposition to delirium and stupor, not unfrequently merging into coma. The respiration is accelerated, and in many instances, owing to the throat-affection, labored and difficult. In most of the cases, a loud gurgling, which is very characteristic, is heard in the throat, particularly when the child is asleep or dozing. This depends in part upon the collection of viscid and tenacious secretions in the fauces,—which sometimes embarrass the respiration so much as to make it necessary to remove them with a mop, or by the operation of an emetic,—and in part upon the existence of the coryza of which we have spoken. The coryza is a symptom of very serious consequence at all ages, but especially in young children. There is generally some cough, which may be frequent and troublesome, though not usually so, unless there be a disposition to laryngeal complication. The voice is hoarse, guttural, and sometimes whispering. When the cough is very frequent, and still more, when it becomes hoarse and croupal, in connection with hoarse or whispering voice, or aphonia, there is great reason to fear the extension of the exudation into the larynx, which constitutes an almost necessarily fatal accident. The face is deeply flushed at first, and the expression anxious. If no improvement take place, the case assumes, in four or five days, or even less, a still more threatening aspect. The pulse becomes very rapid and small; the restlessness and delirium pass into drowsiness or coma; the tongue becomes brown and dry; the teeth are covered with sordes; the lips are dry, cracked, and bleeding; diarrhœa is apt to occur;

and the patient dies in from three to ten days, in a well-marked typhous condition. In other instances, on the contrary, the case runs on from week to week, and at last, after an illness of four, five, or six weeks, the child either dies, or recovers after all chances for life seem to have been lost.

In order to show, in their natural connection, the different symptoms that have just been described, I will cite the following abstract of three of my cases. The first occurred in a boy between seven and eight years old. On the fourth day of the attack the pulse was at 150, and the fauces presented flecks of false membrane. The fauces were very much swelled, and deglutition became difficult; faucial gurgling came on, and the throat was filled with viscid and tenacious secretions. The nasal passages now became occluded by constant discharges, at first mucous, and then muco-purulent, with admixture of membraneous particles. From the fifth to the ninth day, there was an excessive fetor from the nose and mouth. The lymphatic ganglions just beneath the ear swelled very greatly, so as to extend much beyond the line of the inferior maxilla. The tongue and lips became dry and cracked, the teeth were covered with sordès, and the angles of the eyelids inflamed and then ulcerated. On the sixth, seventh, eighth, and ninth days, there were taken away from the mouth and throat of the child, with a mop, hard and most offensive masses of dried up mucous and incrusted epithelium, enveloped in thick, gluey, dark-colored mucus. These masses stuck to the fauces, tongue, and lips, so tenaciously, that they could be removed only by means of a mop, the boy himself being quite unable to detach them. On the seventh, eighth, and ninth days, though the cervical lymphatic glands were very much swelled, the patient was better. The pulse came down gradually from 152 to 132, 128 and 112, and the swallowing improved so much that the child could take liquids with less convulsive effort, and could drink continuously. The drowsiness diminished, and the delirium ceased. On the eighth day a slight erythematous redness appeared on the bridge of the nose, and extended towards the malar bones. The skin of the face and eyelids became somewhat swollen and puffed by an œdematous effusion. On the ninth day the pulse was down to 104, and the skin was nearly natural as to temperature. The swelling was very great on both sides of the neck, and the gland on the right side was red on the surface, very hard, and quite painful. The swallowing was much easier for drinks, but as yet no solid, not even of the softest kind, could be taken. On the fourteenth day from the onset, I opened a very large abscess on the left side of the neck, which discharged abundantly a healthy and laudable pus. On the fifteenth day, I opened a still larger abscess on the right side, and after this perfect recovery took place.

In another example, which has been alluded to already, occurring in a boy between four and five years old, the gravity of the case did not show itself clearly until the sixth day. On the evening of that day the pulse was

128, the skin very hot and dry, and there was an intense eruption of a brick-red color. There was, at the same time, great drowsiness, and utter loss of appetite. Deglutition was difficult, and there was a loud faucial gurgling during sleep. There was now also a considerable amount of membranous exudation in the fauces. During the seventh and eighth days, the boy continued very sick. He was drowsy, almost comatose; the eyes were half open and the conjunctiva minutely injected; there was an abundant coryza, the discharges being composed of offensive mucous and sero-mucous fluid, with an admixture of pus and of flocculent or grumous particles, the latter consisting evidently of broken-down membranous exudation. There was no otorrhœa. The pulse rose from 120 to 128. During the night of the seventh day, the anginose affection was so severe that the child could swallow nothing from 10 P.M. to 3 A.M.; fluids poured into the mouth ran out again in part, and were in part returned through the nostrils. On the tenth day there was still no decided improvement, except that the pulse had fallen to 112. The coryza continued as before; the fauces were covered thickly with whitish exudation; the deglutition was a little easier. The drowsiness continued, as the child dozed nearly all the time, merely rousing from time to time to take drinks, and then, in spite of all solicitation, sinking into sleep again. The abdomen was tympanitic. The urine was rather free, more so than it had been before, and it was also clearer and of a lighter color. By the twelfth day, there was a decided improvement. The pulse had fallen to 106, and the child was not quite so heavy. The act of swallowing was easier, and the fauces showed less of the plastic exudation, but they were still very much coated with tenacious mucus. On the thirteenth and fourteenth days, the patient continued to mend. The pulse fell to 98 and 92; the fauces had become clear of the exudation, and presented instead an excoriated and ulcerated appearance. The secretions into the fauces were less viscid and less copious. The coryza had diminished, and the discharges had become first muco-purulent, and then mucous. The drowsiness had diminished, so that he waked spontaneously, and began to ask for his toys. He now began to demand food, but refused to eat when things were brought to him. On the fifteenth day he was extremely irritable, screaming most violently for the slightest causes. On the sixteenth day the pulse was 92, and the skin nearly natural as to temperature. He was now exceedingly emaciated and very weak. The orifices of the nasal passages were very much irritated and incrusted, but there was scarcely any coryza. The tongue was clean, pink in color, and moist, the thirst not too great, and there was a little appetite. The temper was improving. From this time forward the child improved steadily but slowly, so that he sat up for the first time on the twenty-seventh day. He was as much emaciated at that time as after violent typhoid fever.

The reader must not, however, suppose that all grave cases present throughout their whole course, symptoms as dangerous as those which marked the two examples that have just been detailed. In some, on the contrary, the symptoms, though of such a character as to deserve and require the title of grave, are of a much milder kind. In order to make this part of my description of the disease as clear as may be, I will relate the following as an example of a grave case in which the symptoms, though severe, were neither malignant, nor at any one time very dangerous to life. A girl between seven and eight years old was well at breakfast. In the course of the morning she complained of sore throat, and of not feeling well, and at 4 P.M., when I saw her, was quite feverish, with a frequent pulse and hot skin, and showed already a well-marked, but rather faint scarlet rash upon the trunk of the body, and about the elbows. On the following day the trunk and upper parts of the limbs were covered thickly with an intense eruption, of a bright scarlet color. The fauces were very red, somewhat roughened, and a good deal swelled. The only nervous symptom present was severe frontal headache. There was no unusual agitation, no drowsiness, and nothing like convulsive movement. On the evening of this day, the pulse had run up to 168, and it was rather full, but not hard. The skin was exceedingly hot and burning; during the night there was great restlessness, and the child was wakeful and occasionally delirious. On the third day the symptoms continued much the same, except that the pulse was down in the morning to 152, that the rash had extended to the hands and feet, and that some small spots of whitish exudation were now visible on each tonsil. On the night of this day the fever again increased very much, and the child was again delirious. On the fourth day the pulse was 148; the exudation had increased so much as to cover a good portion of both tonsils, and it had extended also in a slight degree to the posterior wall of the pharynx. There was now a considerable enlargement of the lymphatic glands situated at the angle of the jaw on the left side, and a smaller one on the right side. Deglutition was somewhat painful, and a little difficult, but not seriously so. The case continued in much the same way until the seventh day, when the pulse had fallen to 132, and the eruption had faded very much on the trunk of the body, and to a considerable extent, upon the limbs also. The fauces now exhibited the false membrane over the whole of both tonsils, over the half-arches, the sides of the uvula, and upon the upper portion of the posterior wall of the pharynx. Instead of being whitish and clean-looking as at first, however, the false membranes now looked exactly like sloughing portions of the mucous membrane. They were of a dirty brown color, softened, and seemed to be detaching themselves like sloughs from the tissues beneath. On the ninth day the patient was much better, the pulse having fallen to 116; the eruption had almost wholly disappeared; the heat of skin was very much reduced; the dark-colored portions of false membrane had disappeared from the fauces, leaving the mucous membrane beneath, red, excoriated, and in parts ulcerated. On the thirteenth day, the child was convalescent, the pulse having fallen to 96, the heat of skin having disappeared, and the throat being nearly well. The appetite had returned, the temper was serene and cheerful, and the patient was, in fact, well, with the exception of weakness, and some remaining soreness of the throat.

Laryngitis has been supposed by some persons to be of frequent occurrence in the course of the disease, while others assert that it rarely, if ever, occurs. M. Bretonneau has never met with it. M. Rayer says he does not know that the exudation has ever been found in the larynx or trachea. Tweedie (*Cyclop. Pract. Med.* Art. Scarlatina, p. 640) states that in the dissections he has made he has not seen an instance of the membranous exudation extending into the larynx. That it does sometimes occur, is proved nevertheless, beyond a doubt, by the evidence of MM. Guersant and Blache, Rilliet and Barthez, and others, and by my own observation. MM. Rilliet and Barthez report three cases in which it was found in the larynx after death. These gentlemen state, however, that they have never observed the peculiar symptoms of croup. This does not accord with my own experience, for in one of the cases that I have seen, all the peculiar symptoms of that malady were present during life. The subject of this case was a boy two years of age. A few days after the invasion of the disease, a severe and extensive pseudo-membranous angina was developed. This was soon followed by all the symptoms of croup,—hoarse cough, stridulous respiration, weak, feeble cry, dyspnœa, and whispering voice, which lasted about five days, when the angina and croupal symptoms both diminished very much, and the child seemed in a fair way to recover: suddenly, however, extensive tumefaction of one side of the neck took place, and he died in twenty-four hours. Unfortunately no examination could be made. In another case, in a child between six and seven years old, who had a most violent attack of the disease, severe croupal symptoms set in on the eighth day. They consisted of harsh, croupal cough, stridulous respiration, and great difficulty in swallowing, and the act of swallowing occasioned much harsh cough and strangling. The symptoms continued on the ninth day, after which they moderated, and the child finally recovered entirely. In a third case, also a violent one, in a boy between eight and nine years old, and in which general convulsions occurred on the first and second days, the symptoms had improved a good deal on the third and fourth day. On the fifth day, he was not so well, being more restless and heavy, and having much difficulty in breathing, with some croupiness of sound. These symptoms increased rapidly until they gave rise to most violent fits of suffocation, and caused a fatal termination on the sixth day. In a fourth case, in a child nine months old, death occurred on the thirteenth day from laryngitis occurring in connection with membranous angina. The fatal termination was preceded by hard, dry, and croupal cough, stridulous respiration, and great difficulty of deglutition. In a fifth, in a child under a year old, croupal symptoms made their appearance on the sixth day, the fauces being at that time covered with membranous exudation, and they caused or assisted to cause a fatal termination on the eighth day. In yet another case, the subject of which was between one and two years old, a grave attack of scarlet fever was entirely recovered from. At the end of the second week the child was seized, owing to improper exposure in a cold house, against which the parents had been properly warned, with anasarca. This also was recovered from, and again the parents were warned against improper exposure. On the very day after my last visit, however, the child was taken down stairs into a room with the windows open, and this on a mild day in the month of February. The child was seized now with diphtheritic angina and died, after a few days, of croup. This was in the fourth week from the onset of the scarlet fever. In a seventh case, severe from the beginning, the patient recovered so as to be apparently out of danger, but, owing to the room being very cold from the fact that it was large with wide rattling windows down to the floor, and from the fire being too small, the child took cold, and at the end of the third week, was seized with severe croup, which had many of the features of membranous croup, but which was, in all probability, spasmodic croup, dependent on ulcerative laryngitis. The case continued seven days, during which time the patient was violently ill, but finally, after a most dangerous struggle, it ended favorably.

The symptoms which indicate a disposition to implication of the larynx are frequent, hoarse, and croupal cough, hoarse and whispering voice or cry, aphonia, and dyspnœa with stridulous respiration.

The *duration* of grave cases of scarlet fever is very uncertain. In some the disease runs its course with frightful rapidity, destroying life within a few hours or days. In others, though the symptoms of the early stage may seem to be as violent as in those where death occurs in a very short space of time, the patient either lingers for several days or two or three weeks, and then dies, worn out by the violence or malignancy of the attack, or else, after a most dangerous and apparently desperate illness, he finally struggles through and recovers.

In the most violent of the grave cases, those which I described first as forming a separate group, 16 in number, of which 11 proved fatal, the duration in the fatal cases was between 18 hours and 6 days. Of the 11, one proved fatal in 18 hours, one in 24 hours, one in 36 hours, four in 3 days, one in 4 days, one in 5 days, and two in 6 days. Of the five favorable cases, one lasted 3 weeks, one 4 weeks, two 6 weeks, and one 2 months.

Of the less violent of the grave cases, 41 in number, 14 died and 27 recovered. Of the 14 fatal cases, one died in 4 days, two in 5 days, two in 7 days, three in 8 days, one in 13 days, one in 14 days, one in 15 days, two in 4 weeks, and one in 5 weeks. Of the 27 favorable cases, the duration of the shortest was seven days. The remainder lasted from twelve days to six weeks, the most common period being between three and four weeks.

Complications and sequelæ.—Dropsy.—This is one of the most frequent and important sequelæ of the disease. It occurred in a fifth of the cases of MM. Rilliet and Barthez, and in 29 of the 263, or in about a ninth, of those observed by myself. It occurs generally in the course of the second or third week of the disease, and during the process of desquamation. It is thought to follow cases of moderate severity much more frequently than those of a grave character. Dr. Tweedie states that it has never been observed to succeed a malignant attack. This does not, however, accord with my own experience, since of the 29 examples that I have seen, 6 occurred in grave cases of the disease. The effusion may attack any one of the cavities or the cellular tissue of the body, or all at once. The most common form in which it appears is anasarca, after which the most frequent are, in the order in which they are mentioned, œdema of the lung, hydrothorax, ascites, hydropericardium, and hydrocephalus.

The *exciting cause* of the dropsy is generally believed to be cold, contracted usually by exposure to air and moisture, at too early a period. I have rarely known it to occur when the patient has been confined to the chamber or house until after the twenty-first day; while, on the other hand, I have seen it follow immediately upon a ride in cool weather on the fourteenth day, the child having apparently been convalescent for several days before. I have known it to occur also when the child has been allowed to run through the house exposed to draughts from open doors and windows.

I have been able, in a number of instances, to trace it directly and obviously to cold. Thus, in one very marked example, a boy between six and seven years old had had a mild attack of the disease, and was so entirely recovered that I ceased my visits on the tenth day, leaving strict injunctions with the mother as to the necessity of confining the child to the house for at least ten days longer. On the fourteenth day, he was allowed to sit for fifteen minutes, late in the afternoon of a cool April day, on the marble front-door step. He was seized that night with fever and vomiting, had anasarca next day, and during an illness of two weeks had dropsy of the pericardium, effusion into the right pleural sac, ascites, and some signs of hydrocephalus. In another case, a boy eleven years old had recovered entirely of a mild attack. He slept in a room heated by a stove. On the nineteenth day, the weather being cold, he got up early in the morning to light the fire which had gone out accidentally. He was attacked that day with bronchitis and was, on the following day, anasarcous. In another instance, anasarca was produced at the end of the third week, the child being quite well previously, by his being taken into a cold room to sleep. I could cite other instances of the same kind, but these are enough. It is sufficient to say that in a large majority of the cases that I have seen, it has manifestly and obviously followed improper exposure during the second or third week. In a few cases, however, it has come on without any imprudence whatever, and I have been entirely unable to ascertain the cause.

I am in the habit now of always directing the mother or nurse to keep the patient confined to the chamber for four weeks from the onset of the disease, or, if it be allowed to run through the house, to take care to have it well clothed, and to keep the windows and doors carefully closed should the weather be cold or cloudy. This direction is one of the most important to be given in the course of the disease. It ought to be insisted upon in all and every case, occurring in the cool season of the year.

There has been a good deal of discussion in regard to the exact *pathological cause* of scarlatinous dropsy. Some observers assert that it depends on Bright's disease of the kidney, while others are of opinion that it ought not, on account of its ready curability in most instances, to be referred to that disease, since that is so well known to be nearly always incurable. MM. Rilliet and Barthez state that they found the characteristic renal lesions of Bright's disease in more than half of all their cases of dropsy, and in more than two-thirds of those of anasarca. Frerichs, also, whose opinions on this subject are, perhaps, the most authoritative of all, asserts that the kidneys, after death from scarlatinoid albuminuria, exhibit the lesions characteristic of the first and second stages of Bright's disease. He "rejects *in toto* the opinions entertained by Drs. Johnson, Todd, and others, with reference to the occurrence of a disease subsequently to scarlet fever, to which the term desquamative nephritis can be applied." (*Brit. and For. Med.-Chiurg. Rev.* April, 1852, p. 241, Am. Ed.) M. Legendre, on the other hand, who has studied the subject with much care, is of opinion that "we ought to refer the alterations exhibited by the kidneys as well as the functional disorders connected with those alterations only to ordinary nephritis, or perhaps to simple congestion of the kidneys." (*Recherches Anat.-Pathol. et Clin. sur quelques Mal. de l'Enfance*, p. 320.)

The *dropsical symptoms* usually show themselves in the third or fourth week of the disease. In most of the cases that I have seen they occurred in the third week, but they sometimes appear at the end of the second, and sometimes not until the fourth week. In one case they showed themselves first on the thirtieth day, after the child had been exposed to too cool a temperature in an insufficiently warmed room. They occur, therefore, as a general rule, during the stage of desquamation. The attack is sometimes very sudden, but in most instances it is slow and gradual. The effusion is not commonly the first symptom observed. On the contrary, the dropsy is almost always preceded for one or two days, by the signs of a more or less considerable constitutional disturbance. The patient has usually passed safely through the eruptive stage of the fever, and has been considered for several days, sometimes for a week or ten days, as convalescent, for, be it remarked, the dropsical affection is much more rare after grave than after mild cases. The child has perhaps been running about the house, or it has even been out, the parents supposing, unless warned by the physician, from the disappearance of the fever and other symptoms of illness, and from the return of appetite and gaiety, that complete recovery has taken place. But, either after some exposure, and sometimes without any appreciable cause, the child becomes drooping, languid, and irritable, or uneasy, peevish, and restless. Simultaneously with or very soon after these symptoms, fever sets in; the skin becomes dry and heated; the pulse is frequent and hard, or it is frequent and jerking; the appetite is diminished or lost, and there is more or less thirst; the bowels are generally constipated; the urine is usually diminished; and there is not unfrequently some nausea or vomiting, and complaints of headache.

The symptoms which precede the appearance of the effusion are not always, however, so marked, while in other instances they are scarcely noticeable, and yet the effusion may take place suddenly, and, affecting the subcutaneous cellular tissue and different internal organs simultaneously, may cause a fatal termination with frightful rapidity.

The effusion usually commences in the face, which becomes slightly swollen. The amount of the effusion is sometimes very slight, leaving us in doubt even whether there is really any or not. The swelling is most marked about the eyelids, which look puffed, and it may be confined entirely to them, or, at least, it may be only in them that we can feel sure of its existence. From the face it extends to the hands and feet, and either remains limited to these parts, or spreads over the whole surface, and gradually or rapidly to the internal organs. The skin over the parts in which the effusion has taken place is firm, hard, and elastic to the touch; it does not generally pit, at least not in the early stage, and it is of a dull white color.

In very mild cases the constitutional disturbance is usually but slight, and the effusion may be so small in such instances, as to leave us in doubt as to the cause of the sickness. Generally, however, I have been able to determine the cause of the fever by a careful examination of the face, and particularly of the eyelids, which look a little swelled and distended, and by the presence of a slight puffiness or cushiony appearance of the backs of the hands and feet. In such cases the general symptoms generally pass away after a few days; the urinary secretion, which had been diminished in quantity and of a deeper color than natural, becomes again healthy; the anasarca disappears, and the child returns to its ordinary condition. In more severe cases the general symptoms are all more marked; the anasarca is more extensive and the swelling more considerable; the child, if old enough to describe its sensations, complains of pain in the back, and the lumbar region is tender to the touch; the urine exhibits much more marked changes in its characters; but still, unless some important internal cavity be attacked, the symptoms diminish after a week or ten days, and the child recovers gradually. In still more violent cases, the amount of the effusion is very large indeed, the face is disfigured by the swelling, the limbs are largely distended, the cellular tissue of the trunk of the body is infiltrated, the quantity of urine discharged is very small or the secretion is arrested entirely for one or several days, and the fever is high. If the disease is not removed, the effusion may extend to the internal organs: to the lung, producing œdema of that organ, to the pleural sac, causing hydrothorax, to the pericardium, to the peritoneal cavity, or to the brain. Death may occur in these violent cases from asphyxia occasioned by œdema of the lung, by hydrothorax, or by the obstacle to the circulation caused by the presence of the effusion in the pericardium, from hydrocephalus, or the patient may sink into a comatose state like that which often precedes the fatal termination of Bright's disease in the adult.

It sometimes happens, as was stated above, that death occurs with very great rapidity. MM. Guersant and Blache have known it to end fatally in twelve, fourteen, and thirty-six hours. In a case that came under my own observation in consultation, a child between one and two years old, who had had a very mild attack of scarlet fever, was seized suddenly towards the end of the third week, after it was supposed to be quite well, and after exposure to draughts of cold air in the lower room of a small house, with vomiting, and shortly afterwards with convulsions and coma, which terminated fatally in thirty-six hours. In another case, in a boy between thirteen and fourteen years old, who had had a mild but well-marked attack, and who had convalesced, and been out of bed for a few days, fever with slight headache, and diminution of the urine, came on at the end of the second week. After two days of slight ailment, without any signs of anasarca, he suddenly, without any warning, fell into violent convulsions, which were repeated frequently, with lulls of imperfect consciousness, for a few hours. After twelve hours he became completely comatose, with occasional convulsive seizures, and died at the end of eight hours more.

The symptoms which mark the occurrence of internal effusion will depend of course upon the part attacked. In one case they will be those of œdema of the lung, in another those of hydrothorax, in another those of hydropericardium or ascites, or lastly, those of hydrocephalus.

The particular condition of the urinary function is next to be described. It has already been stated that the amount of urine secreted is less than natural during the early period of the dropsical attack. But, while this is true, it ought to be observed that the patient often voids the secretion more frequently than usual. There is in fact micturition, a symptom occasioned no doubt by the heated and irritating character of the urine, which causes the bladder to contract and expel that fluid so soon as even a small quantity collects. The diminution in the amount of the secretion is usually a very marked symptom. It is sometimes almost or even entirely suppressed for a considerable period. In one case that occurred to myself, in a boy between one and two years old, there was no discharge whatever for a period of thirty-six hours. During this time there was no distension of the bladder, as I ascertained this point by careful palpation and percussion. In another case, which occurred in a girl between three and four years old, and who was nursed by the grandmother, one of the most accurate, reliable, and experienced nurses in the city, I was assured that there was no discharge whatever of urine for five days in succession. During this suppression there was no accumulation in the bladder. On the contrary, the hypogastric region was flat, depressible, and sonorous on percussion. The patient was very ill during all this time. She was feverish and passed nearly the whole time in a semi-comatose state, but could be roused with much effort, so as to show some intelligence; she rejected by vomiting almost everything that was given her, and complained when aroused of severe headache. She had no convulsion nor any convulsive movements, and finally recovered as the kidneys regained gradually their secretory function. In many other cases that have come under my observation, especially those which I have seen in latter years, when I have watched this symptom more carefully, the diminution of the urine has been very great, so much so as to constitute a most marked and reliable symptom.

In very mild cases of dropsy the urine is usually of a deeper color than natural, but still retains its transparency when first voided. It is apt, however, to become turbid on cooling, and to deposit a more or less abundant precipitate. It has in these cases an acid reaction; its specific gravity is somewhat increased; when heated, it becomes cloudy, and a small amount of a flocculent precipitate falls to the bottom of the tube or spoon. In severer cases the urine is very much diminished in quantity; it may be merely of a dark red color, but more commonly it is blackish or brownish in tint, or it is of the color of smoke or soot, or as though ink had been spilled into the vessel; it throws down a deposit which is generally of a reddish-brown color; when heated it yields a very large amount of coagulated albumen. If the spontaneous deposit be examined with the microscope in these cases, it is found to consist of crystals of lithate of ammonia, of blood-globules, scarcely altered, and of mucous corpuscles and epithelial scales. The discoloration in black or its shades, above described, depends evidently on the presence of blood in the urine. This has been ascertained by the use of the microscope.

M. Legendre states that in fourteen cases analyzed by him, the urine was always coagulable by heat and nitric acid. The precipitate varied, however, in quantity and appearance, according to the color of the urine, and the distance of time from the invasion of the anasarca. Very abundant when the blackish or reddish color indicated the presence of a large quantity of blood, the coagulum diminished as the urine became lighter colored. When the urine contained much blood, the precipitate consisted of a number of flocculi, which fell rapidly to the bottom of the tube; when, on the contrary, the amount of blood was small, the urine being of a pale yellow color, the precipitate, caused at the moment of boiling, merely gave an opaline tint to the fluid, and as the boiling was continued, furnished a delicate coagulum, which subsided very slowly. The color of the precipitate is said not to be of a pure white color as in Bright's disease, but of a dirty brown or ash gray tint.

The form which the dropsy takes varies greatly in different cases, and seems to depend on inappreciable causes. Of the 29 cases that I have met with, anasarca alone was present in 22. In 5 hydrocephalus was present, and in 4 of these anasarca also existed. In 1 there were some symptoms which indicated the probable existence of a small amount of effusion in the brain, but they were not at all violent. Lastly, in 1, there was extensive anasarca, hydrothorax of the right side, hydropericardium, and ascites.

The degree of danger to be apprehended from this complication depends upon the form which it assumes. M. Cazenave (*Loc. cit.* p. 52) says that there is no danger from it so long as it remains confined to the subcutaneous cellular tissue; and this is probably true. When, however, it attacks the brain or lungs it becomes exceedingly dangerous. Dr. Wood (*Pract. of Med.* vol. i, p. 408) says that he has seen but one fatal case from dropsy, and in that the heart was diseased. Of the 29 cases that I have had under charge, 6 were fatal. Of the 22 cases in which the effusion was anasarcous alone, but one was fatal. All of the 5 in which well-marked hydrocephalus occurred in connection with anasarca, ended fatally, In one case there were present slight symptoms of hydrocephalus. This one ended favorably. In the last case to be adverted to, that in which hydrothorax, hydropericardium, and ascites were added to the anasarca, the patient recovered after a long and severe illness.

In addition to the cases of dropsy just referred to, and which all occurred in my own practice, I have seen two examples of hydrocephalus in consultation, one of which came on very suddenly in a young child and proved fatal in thirty-six hours, while the other terminated favorably after a severe illness of nearly two weeks. In the latter case, the patient, a girl, between three and four years old, was in a semi-comatose state for a week, with fever, excessive irritability of the stomach, and complaints of headache. For a period of five days the urine was entirely suppressed, not a drop having been voided during all that time, at least with the knowledge of the nurse, who was a most accurate and competent person. In a third case, seen in consultation, the child died after ten days' violent illness, with ascites, extensive hydrothorax, and dropsy of the pericardium. Lastly, in a fourth case, also seen in consultation, the patient, an infant in its second year, after having had anasarca for a few days, became drowsy, had frequent vomiting and heat of head, but recovered under the use of active counter-irritation over the back and diuretics. It would seem to be much more dangerous in the Parisian hospitals than in private practice in this country, since MM. Guersant and Blache speak of having seen it prove fatal in twelve, fourteen, and thirty-six hours, after one or two weeks, or even two or three months; and MM. Rilliet and Barthez refer to it as often proving fatal.

Diarrhœa is not an uncommon accident in the disease. It generally depends on simple functional derangement of the bowels. In some cases, however, it is so severe or long-continued as to constitute a serious complication. Under these circumstances, it depends on follicular entero-colitis, slight erythematous inflammation, or simple softening of the intestinal mucous membrane.

Bronchitis and pneumonia are rare. *Inflammation of the serous membranes* is more common, occasioning in some cases the dropsical effusions which have already been treated of. Scarlatina may be coincident with variola or measles. I have never seen it in connection with the former, but in two cases which came under my observation it was complicated with measles.

Anatomical Lesions.—The eruption sometimes disappears entirely after death, and on other occasions assumes a deep livid or purple appearance. The epidermis is generally loosened upon the integument, so as to be peeled off with great facility. The most important lesions, and those which seem to belong to the nature of the disease independent of complications, are congestions of different parts of the body, particularly the brain, serous membranes, spleen, glands of Peyer, and intestinal follicles. It is a curious fact that, even when the cerebral symptoms have been most severe, and we might expect to find evidences of violent inflammation of the brain, nothing is observed after death, in the majority of cases, but congestion of the large veins and sinuses of the brain, of the pia mater, or of the cerebral substance. There is rarely any unnatural amount of serous effusion into the ventricles, or meshes of the pia mater. Dr. Tweedie says, "indeed, we have frequently been surprised, in examining rapidly fatal cases, to find no morbid appearances that could explain the cause of death." Nevertheless, effusions within the cranium sometimes exist, as has been already stated in the remarks upon hydrocephalus.

The respiratory organs are usually healthy, with the exception of congestion and serous engorgement. The abdominal viscera often present appearances analogous to those of typhoid fever. The glands of Brunner and Peyer are not unfrequently enlarged, and they are sometimes reddened or softened. In a smaller number of cases the mesenteric glands are slightly inflamed and increased in size, and the spleen is redder than usual and softened. These lesions have no necessary relation to the form of the disease, since they are often absent in typhoid cases, and present in those of a different type.

The kidneys are healthy, with the exception of some degree of congestion, unless the case has been complicated with dropsy. Under these circumstances they often present the characteristic lesions of Bright's disease.

The blood exhibits very different appearances in different cases. It is viscid or serous, dark-colored or light, and fluid or coagulated, the clots being of variable color and density. The proportion of its constituent elements is changed. The fibrine maintains its usual relation to the mass of the fluid (3 parts in 1000), or it is very slightly augmented, while the quantity of the globules is increased to 136 or 146 parts, according to M. Andral, instead of 127, in 1000 parts.

Diagnosis.—It is impossible to distinguish scarlatina from the other eruptive fevers by the symptoms which precede the eruption. The only signs upon which a diagnosis at that time might be grounded, are great frequency of pulse, which is characteristic of this disease, some soreness or redness of the fauces, and the prevalence of the disease in the community. But these are all exceedingly fallacious, and the physician should be content to wait for the eruption before he ventures to speak with certainty. After the eruption has come out it can scarcely be mistaken for anything else, except it be roseola.

From measles it may be distinguished by the differences in the prodromes, course, and eruption of the two affections. The prodromic stage of scarlatina rarely lasts more than twenty-four hours, and is very often much less; that of measles, on the contrary, is almost always from three to four days; in scarlatina the rash appears suddenly and often spreads over the whole body in a single day; in measles it appears on the face first and extends gradually to the rest of the surface, seldom reaching the hands and feet before the end of the second day; the eruption of measles occurs first in distinct papulæ, which coalesce and form patches of an irregular crescentic shape, while that of scarlatina is in the form of innumerable minute dots or punctuations, placed so closely together as to give to large portions of the surface a uniform color, like that produced by blushing. The color of the two eruptions is different, that of measles being dark like raspberry juice, and that of scarlatina of a more or less bright scarlet tint. The presence of catarrhal symptoms in measles and their absence in scarlet fever; the absence of angina in the former disease, or its very slight character, and the severity of the throat-affection in scarlatina; and lastly, the greater severity of the febrile symptoms, particularly the frequency of the pulse and the heat of skin in scarlatina, are other points of difference which will assist in making the diagnosis, rarely, it seems to me, difficult, still more certain. A very great frequency of the pulse is one of the most unfailing symptoms of the early stage of scarlet fever. It almost always runs up to 140, 150, or 160, in young children, within the first twelve or twenty-four hours, and to 120, 130, 140, or higher, in those who are older. Nevertheless, this, like all other symptoms, is sometimes wanting. I have lately seen a boy, between five and six years old, with a marked but very safe attack of the disease, whose pulse ranged between 80 and 90 throughout the sickness. This was, however, the only case I have ever met with, in which the pulse remained so little disturbed.

It is sometimes very difficult to determine with precision between roseola and scarlet fever. By the eruption alone, I believe it to be often impossible. I have seen quite a number of cases in which the eruption of roseola resembled so closely that of scarlet fever, that I should have been obliged to confess my inability to make the distinction, had it not been for the other symptoms, and particularly the frequency of the circulation, the heat of the skin, and the throat-symptoms. The most important differential symptoms are the tint of the eruption, which in roseola is rose-colored, in scarlet fever, bright red or scarlet; the characters of the patches of eruption, which are more regular in shape, but of much smaller size in roseola than in scarlet fever; the absence or very slight degree of anginose inflammation in roseola; and, what is decidedly the most important of all, the very much slighter degree of febrile reaction in roseola, in which the pulse, instead of being doubled in frequency as it is in scarlet fever, is scarcely above its natural rate, and in which the heat of skin is but little above the standard of health. Moreover, roseola is generally of shorter duration, and is a milder affection, and therefore accompanied by far less fever and general disturbance of the constitution.

PROGNOSIS.—It is impossible to obtain a useful average mortality of scarlet fever, since the disease varies so greatly in different epidemics, and under different hygienic conditions, that the results obtained during one period are inapplicable to cases observed at another. This is proved by the experience of almost every physician, and by the evidence of many writers. It is proved, also, by the following facts. M. Gueretin (*Loc. cit.* p. 283) states that the mortality in the epidemic observed by him was about one in twelve: of 99 cases, 8 died. MM. Rilliet and Barthez lost a little more than half their cases: of 87, the total, 46 were fatal. These cases, let it be remarked, however, occurred in the hospital for children in Paris, which will account for the heavy fatality. Of the 263 cases that I have observed, 28, or rather more than one-ninth, were fatal. Of the 263 cases, 104 occurred between 1849 and 1853, and in those the mortality was much smaller than in those which occurred prior to that year. Of 104, 11 were fatal, or about one in nine and a half. Seventy-eight cases occurred between 1853 and the spring of 1857. Of these 78, only 4, or one in twelve, were fatal. Of the 81 cases observed previous to 1849, 13, or about in 1 in 6, proved fatal. The mortality met with by myself in private practice, has greatly varied, therefore, in different series of years. In one series, it was 1 in 6; in another 1 in 9½; and in a third, 1 in 12. Lastly, to show the influence of the epidemic type upon the mortality still more clearly, I may state that, of the last series of cases observed, 78 in number, 43 occurred during the epidemic which lasted from the summer of 1856 to the spring of 1857, and of these only 3, or 1 in 14, died.

The prognosis must be based, therefore, in part on the character of the epidemic prevailing at the time. It must depend also on the nature of the case. Mild and regular cases are rarely fatal. Of 206 mild cases that have been under my care, only three proved fatal. One of these would probably not have so terminated had it not been for the imprudence of the nurse. This was, in fact, the case of a young child who had recovered from the eruptive stage of the disease, but whom the nurse carried out of the room in the second week, notwithstanding express directions given her to the contrary. The child took cold and was seized with catarrh and slight anasarca; on the fifteenth day symptoms of hydrocephalus set in, and he died on the seventeenth day, comatose, and with convulsive movements of different parts of the body. The second case was that of the boy thirteen years old, already described, who died of sudden hydrocephalus at the end of the second week. The third fatal case occurred in a girl between eight and nine years old, who died suddenly at the end of six weeks. The patient had convalesced sufficiently to have been out several times, but remained very hydræmic and weak. After being much fatigued one afternoon by playing with some little friends, she was seized next day with vomiting, and soon after with great difficulty of breathing and extremely rapid and feeble action of the heart. These symptoms increased on the following day. The dyspnœa was most severe, and was attended with cyanotic color of the hands and face, and with cold colliquative sweats. The lungs were free, there was no cough, and auscultation revealed no pericardial lesion. Death occurred suddenly at the end of a day and a half. No post-mortem was made, owing to circumstances that could not be controlled. My own opinion was, and is, that the death was caused by a coagulum in the heart.

Grave cases of scarlet fever are always, on the contrary, exceedingly dangerous, since of 57 cases of this kind that I have had under charge, 25, or nearly a half, were fatal. In order to render the description of the symptoms of this class of cases more clear, I divided them into two groups; one, in which the onset of the disease is instant and most violent, being characterized by excessive disturbance of the nervous system, taking the form usually of convulsions, but sometimes only of profound coma; and a second, in which the symptoms of the onset, though severe enough usually from the first to mark the character of the case as grave, are less violent than in the first group, and especially not marked by the occurrence of convulsive phenomena. Of 16 cases belonging to the first group 11 died; while of 41 belonging to the second 14 died. Violent nervous symptoms occurring early in scarlet fever augur, therefore, great danger to the patient, since of 16 cases in which they were present, 11 died, whilst of 41 in which they were more moderate, though still marked and severe, only 14 died.

The character of the nervous symptoms is, therefore, all-important in the determination of the prognosis, as the probable termination of the case is to be foretold more certainly by a just appreciation of these particular phenomena of the disease, than by any other means. Excessive jactitation or irritability, delirium, coma, and the hydrocephalic cries, are all unfavorable symptoms, but not in the same degree as are those connected with the locomotive apparatus. MM. Rilliet and Barthez state that they have seen recoveries take place in cases in which the intelligence of the patient had been very much disordered, while of those who, "*during the first fifteen days of scarlatina,* were taken with convulsions, convulsive movements, contractions, in a word, any symptoms affecting the locomotive apparatus, all, without exception, died." This does not accord exactly with my own experience, though nearly enough so to show how exceedingly dangerous are the symptoms just enumerated when they occur early in the disease. General convulsions occurred on the first day of the disease in 7 of the 57 grave cases observed by myself, and of these not one terminated fortunately; in four they occurred on the second day, and of these three recovered and one died; in one they occurred on the ninth day, and this patient also recovered: in another case there were no general convulsions, but on the first day there were automatic motions, with involuntary extensor motions of the arms and fingers, and on the second day strabismus, with a continuation of the automatic motions. This case proved fatal. Of the 13 cases, therefore, in which marked disturbances of the muscular system ococurred, only 4 ended favorably. Of 8 subjects in which the convulsive phenomena occurred on the first day of the disease not one escaped. Of 5 subjects in whom these symptoms appeared on or after the second day, 4 escaped. One of the favorable cases occurred in a boy seven years old, who had a general convulsion, lasting several minutes, on the second day of the attack; this was followed by delirium and coma alternately, but no return of the convulsions. The case was a most violent one, and lasted six weeks, leaving the child at the termination very deaf, but otherwise in good health. The second case occurred in a child five months old. The convulsive symptoms appeared on the ninth day, and consisted of strabismus, spasmodic retraction of the head, and occasional slight spasms of the limbs. They alternated with coma, and disappeared on the tenth day, until the seventeenth and eighteenth, when the strabismus reappeared. The child recovered perfectly. The third was that of a very healthy and vigorous boy between eight and nine years old, who, on the second day of an attack which had begun like a severe cholera morbus, had, twice, fits of insensibility, with stiffening of the extensor muscles of the fingers, rigid contractions of the flexors of the arms, and spasms of the eyeballs. This case proved afterwards very violent, so that the patient nearly died on the fifth day, with asphyctic symptoms caused by very great swelling of the tonsils and fauces and enormous enlargement of the external cervical lymphatic glands, complicated moreover with extensive acute œdema about the chin and front of the neck. These symptoms were followed again by diphtheritic deposit covering the whole of the pharynx. He finally, however, recovered perfectly. The fourth case was that of a boy between five and six years old, who, on the second day, had an attack of general convulsions, which were repeated frequently on the third day. This patient continued very ill for several days, and when, at last, he began to improve somewhat in the middle of the second week, it was found that he had lost entirely the power of speech, and all control over nearly the whole of the locomotive apparatus of the body. He could neither lift his head nor turn it; the legs were immovable; the hands were perfectly helpless. The only motion that remained was a jerking, almost automatic movement, apparently, of the arms upon the shoulders, and the forearms upon the arms. But even these were most irregular, and badly co-ordinated. He was very much in the condition of a new-born child. It was very difficult to ascertain what the condition of his senses was, but after a short time we were able to satisfy ourselves that he saw and heard, and only after many weeks was he able to hold a very light object in his fingers, then to move his head from side to side, and at a still later period to hold it up. At the end of about ten months, he could sit in a chair when once placed in it, but could not sit on the floor unsupported. At the end of three months he was learning to walk by being held up by the arms. He had never spoken a word. The only approach to anything like articulation was his ability to hum a low gentle musical note; his intellectual faculties, as exhibited by signs, had regained their natural condition at this time. At the end of ten months, he could speak intelligibly some three or four words. The fifth case was that of a male infant, nine months old, who, on the second day, had severe general convulsions, followed by very deep drowsiness. The eruption became intense, and on the third day the convulsive symptoms recurred from time to time, but with less violence. On the fourth day he seemed somewhat better, but on the fifth, very severe anginose symptoms set in, and he died.

Again, in 18 of the 57 grave cases, severe and more or less prolonged delirium or coma occurred, and of these 12 died. We may conclude, therefore, that convulsive symptoms appearing early in scarlet fever indicate a highly dangerous and, in all probability, a fatal attack; while severe, and especially prolonged delirium or coma, are also extremely unfavorable symptoms, but somewhat less so than are those of a convulsive character.

Other unfavorable symptoms are: extremely frequent or very violent pulse; intense heat or unnatural coolness of the skin; deficiency or sudden disappearance of the eruption; a livid or purple tint of the eruption; slow and imperfect capillary circulation, as ascertained by pressure; the appearance of petechiæ, ecchymoses, or hemorrhages; violent vomiting and colliquative diarrhœa; great violence of the throat-affection, whether from tumefaction, great abundance of pseudo-membranous exudation, or disposition to ulceration and sloughing; and lastly, severe coryza or otorrhœa. A disposition to a typhoid state, indicated by dulness of the intelligence, dusky hue of the skin, frequent and feeble pulse, dry, brown tongue, sordes on the teeth, meteorism, and disposition to diarrhœa, is always dangerous.

When, on the contrary, the fever is moderate, the cerebral symptoms absent or very slight, and the eruption regular, and of a bright tint; when there is no disposition to typhoid symptoms; when the throat-affection is mild, and the disease pursues a regular, uniform course, we have every reason to expect a favorable termination in a large majority of the cases.

TREATMENT.—*Hygienic treatment.*—In all cases of the disease, whether of the mild or grave kind, the strictest attention should be paid to the hygienic condition of the patient. The room in which the child is placed ought to be, if possible, large, and at all events well ventilated. The temperature in winter should be carefully attended to. I usually direct it to be kept at from 68° to 70° F., during the early stages of the disease, unless the fever is violent and the child complains of heat, in which case it may be allowed to fall to 66°, or even 62°. The clothing ought to be moderate, not enough to increase the heat of the skin, nor yet so little as to endanger chilliness. During the latter stages of the disease, when the fever has subsided, and particularly when the heat of the skin has fallen, the temperature of the chamber ought to be kept, as a general rule, at from 68° to 70°, and, when the child is pale, weak, and chilly it may be maintained with great propriety, at 72°.

One of the most important points in the treatment of scarlet fever is, undoubtedly, the management of the patient during the convalescence, and especially during the desquamative period. It is during this period that the child is liable, as we have already shown in our account of the different complications and sequelæ of the disease, to dropsy, which is the most frequent, and at the same time the most dangerous accident to which the patient is exposed. There can be no doubt, I think, from the opinions expressed by various writers, and also from my own experience, that the most common cause of this accident is exposure to cold. Chilling of the body, no matter how produced, is exceedingly apt, when it occurs within three, or, more rarely, four weeks from the invasion of scarlet fever, to be followed by a more or less marked attack of some form of dropsy. It is true, I am well aware that dropsical effusions sometimes take place in subjects who have been guarded in the most careful possible manner, in whom there has been no evident exposure to cold; but it is also true, that a much larger number of those who have been thus guarded, escape, than of those who are not thus taken care of. I have therefore no doubt whatever, that it is most wise and prudent to confine the patient to well-warmed rooms, or at least to the house, for twenty-one or twenty-eight days from the outset of the disease. The fact that the attack has been a slight one only makes it the more necessary to carry out this regulation, as it has been found by experience that the dropsy occurs more frequently after mild than after severe attacks. M. Legendre (*Recherches Anat.-Pathol.* p. 311) is of opinion that the patient ought not to be allowed to leave the house until the skin, completely deprived of the old epidermis, shall have regained its suppleness, its smooth and polished appearance, and all its functions. When, therefore, after a mild case, the desquamation is completely terminated in three weeks, the patient, he thinks, may be allowed to go out. But, on the contrary, this period would be too short by one-half, if the eruption has been very intense, as the desquamation is, in such cases, scarcely finished on the hands and feet at that time. My own opinion, as already stated, is, that in the cool seasons of the year, the patient ought to be secluded in the house during full four weeks.

The *diet* should consist in the early stage, as a general rule, of weak milk and water with or without bread, according to the severity of the case and the state of the stomach. If the fever be very severe, barley-water or arrow-root prepared with water alone, may be given. Nothing more substantial than these articles ought to be permitted, in most cases, until after the patient is decidedly convalescent, when broth with rice boiled in it, or plain boiled rice, and then some light meat in small quantity, may be allowed, until the child gradually resumes its old habits. When, however, the case runs on for a length of time, or symptoms of prostration come on, light chicken or mutton water may be given at once, and small quantities of wine whey, or weak milk punch added, according to the degree of the symptoms.

Treatment of Mild Cases.—A large majority of these cases need but very simple treatment. Some laxative, as magnesia, castor oil, or syrup of rhubarb, in such dose as to procure two or three stools, may commence the treatment. After this, a diaphoretic may be given every two or four hours. If the skin is very hot and dry, I prefer the antimonial wine and sweet spts. of nitre, in the dose of two to four drops of the former, with eight or ten of the latter; or a teaspoonful of neutral mixture, with a little nitre, or the spts. mindereri, may be substituted. At the same time a bath should be administered. This may be either a common bath at a moderate temperature (94° to 96°), or an affusion bath, given in the following manner. Prepare a bucketful of warm water (96° to 98°) containing from half a pint to a pint of vinegar; undress the child, and place it standing in a large tub, with its head and shoulders bent slightly forwards; then pour the vinegar and water from a pitcher over the body, letting it fall from a height of two or three feet, in a small, steady stream, on the nucha, so that it shall run over the whole surface and fall into the tub. The moment the bath is finished, wrap the child in a warm cotton sheet, over which should be put a light blanket, and lay it in bed, or hold it on the lap for twenty minutes, or longer, if perspiration is induced, after which it is to be wiped dry and dressed. If the fever be violent and accompanied with great dryness of the skin, two bucketsful of water may be used. This bath is often followed by copious perspiration and sound, refreshing sleep, with great diminution of the heat and restlessness. It may be repeated every three or four hours, if necessary. If the case be so mild as not to require an immersion bath, a foot-bath may be used with great benefit, as a sedative and diaphoretic. A moderate dose of some mild cathartic, or an enema, should be used from time to time, through the course of the disease, if the bowels are not moved spontaneously. This simple treatment will, I believe, carry a large majority of the mild cases to a safe termination. Sometimes, however, even while the disease pursues a regular, uniform course, the general or local symptoms assume a degree of activity which renders more energetic treatment necessary.

The febrile movement may be unusually active, and attended with so much restlessness, or by such an amount of delirium at night, as to threaten a change into the grave form of the malady. In cases of this kind it was customary at one time, and I formerly followed this practice myself, to use general or local depletion. Of late years, however, I have entirely abandoned general bleeding, having found it either unnecessary or hurtful, and have never ventured upon more than the use of a few leeches or wet cups, and even this I now very rarely employ. When, however, there has been unusual restlessness, with violent complaints of headache, in older children, without very great fever, I have resorted to very moderate applications of leeches to the temples with benefit. At the same time a somewhat active cathartic may be given. It is necessary to be careful in the use of purgatives; for it must be improper and unsafe to give those which are irritating, or such doses of others as might prove so, in a disease which in its severe forms, shows a strong disposition to choleratic states of the bowels. I would rather, therefore, give a medium dose of a laxative remedy, and repeat it from time to time, than run the risk of exciting by an overdose, a condition of irritation which could scarcely fail to do mischief by interfering with the regular course of the malady. For these reasons I generally resort to magnesia, followed by lemonade; to castor oil in orange juice, in the dose of a dessert-spoonful for children over three years of age, and a teaspoonful under that age; to simple syrup of rhubarb in the dose of a dessert or tablespoonful; to a teaspoonful of salts; or some similar remedy, giving directions that the dose shall be repeated in six hours, or assisted by an enema, if it fail to operate. At the same time the affusion bath as above directed, or the tepid immersion bath, ought to be used several times in the twenty-four hours, according to its effects, the temperature of the body, and the degree of restlessness.

The angina needs no treatment whatever in a large majority of these cases. The physician should never, however, neglect to examine the fauces, when the case assumes any degree of severity. If, under these circumstances, he finds evidence of severe inflammation of those parts, in the form of swelling, bright or deep redness, and yet more, patches of whitish exudation, he may fairly presume that this assists to occasion the unusual severity of the general symptoms, and he should immediately apply remedies to check or modify the local disease. A great many different local remedies are recommended by different authorities. Those which I make use of are the following: a solution of nitrate of silver (10 or 20 grs. to the ounce), to be applied twice or three times a day; powdered alum used in the same way; and a solution of sulphate of copper and quinine (6 grains of each to an ounce of rose-water), which has been very much used and greatly depended upon by my father, and which I have found very beneficial. This is to be applied in the same manner as the solution of nitrate of silver. With one of these I have always succeeded very well in this class of cases. Rilliet and Barthez recommend the following preparation:

℞.—Acid Muriat., ... ʒi vel ʒii.
Mel. Rosæ, ... ℥i.—M.

It is proper to avoid, under the circumstances above described, the use of caustic applications, as they are not needed, and as they might aggravate the local disease.

Within the last few years *inunction* has been highly recommended in the treatment of scarlet fever. It was first proposed and strongly urged I believe upon the profession, by Dr. Schneeman, a German physician. Dr.

Schneeman makes use of bacon fat. He takes a piece about as large as the hand, still covered with its rind, in order to obtain a firm grasp upon it. On the soft side of the piece, slits are made in various directions, in order to allow the oozing out of the fat. The patient is to be rubbed with this, as soon as we are aware of the nature of the case, from head to foot, excepting the face and scalp, every morning and evening. The rubbing is to be so performed, that the skin may be regularly but not too quickly saturated with the fat. During the process, only the part being rubbed is to be uncovered, or the whole can be done under the bed-clothes. (*Ranking's Abst.* No. 12, p. 26.)

For my own part, I have never made use of the bacon fat for the purpose of inunction, except in two instances, being deterred by its disagreeable character. I have, however, employed inunction with other unctuous substances very frequently. Indeed, for the last eight years, I make use of it habitually, in all my cases. The ointment I prefer is the following. I have tried others, but find this one the most agreeable and most convenient:

℞.—Glycerinæ, ... ʒi.
Ungt. Aq. Rosæ, ... ℥i.—M.

There can be no doubt, at the present time, that the employment of inunction in scarlet fever has proved a most useful addition to our former means of treatment. In my hands it has had the effect of allaying, in all cases, the violent irritation caused by the intense heat and inflammation of the skin. In nearly all cases, it sensibly diminishes the frequency of the pulse, and in many this effect is very strongly marked. It removes, of course, the dryness and harshness of the skin, keeping it instead, soft and moist. It lessens or even removes the burning, irritation, and itching, caused by the eruption. By these effects, to wit, lowering of the pulse, and alleviation of the external heat, dryness, itching, and irritation, it cannot but and evidently does modify and diminish, most happily, the injurious effects of the disease upon the constitution at large. So great is the comfort it gives to the patient that I have several times had young children, still untaught to speak, to make signs and motions, at shorter or longer intervals, showing their desire to have the application renewed. The frequency of the application must depend upon the case. When the eruption is intense, the skin very hot, and the febrile symptoms marked, they should be made every two or four hours, or even oftener. In milder cases they need to be repeated only three or four times in the twenty-four hours.

Treatment of grave cases.—Bloodletting.—The propriety of bloodletting in grave cases of the disease is questioned by many able observers, while others recommend it highly as an efficient means of controlling the dangerous symptoms. MM. Guersant and Blache (*Loc. cit.* p. 177) state that in the ataxic malignant form "it is rarely useful to take blood, unless the general reaction is very acute;" and in another place they say that in the adynamic typhoid form, bleeding has never seemed to them to be of any use. Dr. Burrows (*Libr. Pract. Med.* vol. i, p. 365) states that Dr. Williams has drawn up a table of different epidemics of scarlet fever which have prevailed from 1763 to 1834. Dr. W. says, "the conclusion which inevitably follows is, that the chances of recovery are diminished by the practice of bleeding, in the ratio of nearly four to one, as compared with the chances, supposing the patient not to have been bled." Dr. Burrows says, speaking of the anginose form, that in particular epidemics, or in some cases, bleeding may be required, but that in general the state of the circulation will not bear bleeding. Under the head of scarlatina maligna, he says: "If bloodletting from the arm be a remedy of doubtful propriety in the former two varieties, it is here hazardous in the extreme. At the very onset of the disease the condition of the throat, or fierce delirium, may require the application of a few leeches beneath the jaw, or the abstraction of a few ounces of blood by cupping from the back of the neck." Dr. G. B. Wood (*Pract. of Med.* vol. i, p. 406) observes, that he has "seldom found it advisable to bleed in any case; and I do not remember the instance in which it appears to me that I had occasion to repent my abstinence." Dr. Caspar Morris, of this city, in his excellent lectures on scarlet fever (Philad. 1851, p. 67), states that, in cases in which there is violent delirium, with great heat of skin, very rapid pulse, and extreme restlessness, and not unfrequently convulsions, or at the least violent muscular twitching, bleeding, whether local or general, is "almost always followed by fatal results." MM. Rilliet and Barthez recommend a bleeding in the early stage of the anginose form, to be followed by an application of leeches in robust but not in delicate children. In the malignant form with cerebral symptoms they recommend a bleeding, if possible. M. Gueretin (*Loc. cit.* p. 301) says, speaking of malignant cases, that the most energetic antiphlogistic treatment did not manifestly arrest the progress of the violent febrile phenomena, and that in robust subjects leeches to the neck and mastoid processes did not sensibly ameliorate the cerebral congestion and delirium. Dr. Eberle follows Armstrong in recommending active bloodletting in the *early period* of the malignant form, but adds that it must only be during that period, "for the approach of collapse renders bloodletting utterly inadmissible."

MM. Trousseau and Pidoux (*Trait. de Thérapeutique*, t. i, p. 591, 597), strongly oppose bloodletting in scarlet fever, except in some very rare cases, in which there is "a state of general turgescence, cerebral congestion, painful tumefaction with stiffness of the articulations, rather elevated pulse, vomiting, and imperfect generalization of the eruption." At page 596 are the following words, "of all the eruptive fevers, scarlatina supports antiphlogistic treatment least well."

It ought to be recollected in the consideration of the propriety of bloodletting, that the cerebral symptoms which make their appearance in the early part of the disease, even during the first two weeks, are rarely dependent on inflammatory processes going on in the brain. This has been already shown in our remarks upon the cerebral symptoms. I will merely repeat here, that MM. Rilliet and Barthez state that a more or less active sanguine congestion is the only alteration generally, but not always, found in fatal cases, and that in some instances this congestion is not greater than what is met with in several diseases unaccompanied by cerebral symptoms. Are not these symptoms very analogous to those which occur in typhoid fever, and which, according to Louis, cannot be shown to depend on any *appreciable* lesion of the brain? It is altogether probable that this class of symptoms is dependent upon the state of the blood, which, being diseased or poisoned, fails to carry on healthfully the functions of the nervous centres. If this supposition be correct, what good can arise from a treatment which only takes from the circulating channels a small quantity of fluid, leaving behind a remainder just as irritating and unfit for carrying on the functions of the economy as that which has been removed?

On the whole, it is clear, I think, that the weight of evidence is against the use of bloodletting to any considerable extent in grave cases. It was the custom in this city, some eleven years since, to make frequent use of depletion in this disease, and I saw, therefore, a number of cases treated in that way. For my own part I am convinced from what I then saw, that depletion, unless it be employed only as a local means, and even then with great care, is much more apt to do harm than good in grave cases. It increased, according to my experience, the frequency of the pulse; it had no effect in diminishing the heat of the skin; the nervous symptoms, the delirium or stupor, and the convulsive phenomena, grew worse rapidly, under its use; in fact the whole aspect of the case, instead of improving under the loss of blood, appeared to me to become more and more unfavorable with every repetition of the remedy. Most assuredly I have never seen it produce any of the evidently favorable effects which follow its employment in the phlegmasia, or in sudden determinations of blood to the brain. In mild cases, on the contrary, in which the patient suffers greatly from the violence of the febrile reaction, and from the enormous development of heat, or in which there is great pain in the head or other severe local symptoms, depletion, either topically or by venesection, may be sometimes admissible; but, even in these cases, it ought to be made use of with great prudence and circumspection.

Of late years, there has been, I think, a growing disposition in this city, against the use of bloodletting, most practitioners with whom I have spoken having abandoned it in great measure, at least in grave cases. This may be, and probably is, owing in part to the fact that the epidemics that have prevailed during the last twelve or thirteen years have been of a severe and dangerous character.

My personal experience in regard to depletion in scarlet fever has been the following. I have known general depletion to prove useful in seven mild cases, in which there was a tendency towards the grave form, as shown by the presence of excessive reaction, and still more by great jactitation and irritability, alternating with drowsiness and delirium,—at least this was my opinion several years back; of late years, however, as stated above, I have found such cases do just as well without general bleeding, and as it is always a doubtful remedy I have abandoned its use. But in those sudden attacks of the disease, in which it assumes from the very start, the terrible symptoms which threaten extreme danger to the patient; in which we find the child within a few hours of the onset delirious or comatose, or laboring under convulsions, convulsive movements, or contractions; in which the eruption is imperfect or scanty, or copious and of a deep livid tint; in which, in other words, there are either strongly marked ataxic or adynamic symptoms, general bloodletting has never seemed to me at all advantageous, and I have several times thought it very injurious. As to leeches, I have never known them to be really useful except in two cases, and in these they were used very sparingly, and after an interval of two days. In all the other cases they appeared to be without any effect. Depletion was made use of in 11 of the 57 grave cases that have been under my charge. In 4 of the 11 venesection was performed once; in three it was performed twice, and in one of these leeches also were applied; in two leeches were applied once, and in two twice. In a third case a wet cup was applied to each temple on two occasions, and seemingly with benefit. Of the 11 cases, 7 proved fatal. Of the four recoveries, one occurred in a patient who was bled once, one in a subject who was leeched once, the third in one who was leeched twice, and the fourth in one who was twice moderately cupped on the temples.

Purgatives ought to be used with care, and only in such doses as to secure a soluble state of the bowels, and never to cause violent diarrhœa. At the onset of severe cases, attended with prostration and malignant symptoms, in particular, the exhibition of large doses of active cathartics ought to be carefully avoided. It cannot but be injurious to perturbate violently so important a system as the digestive, and through it the nervous system, in a disease like scarlet fever, in which nature is about to throw out an intense eruption upon the skin, and in which there is already only too much disposition towards disorder of the nervous actions of the body. M. Gueretin, however, recommends, as the only treatment that he has found to be really useful in the malignant form, small doses of purgatives repeated two, three, or four times a day, so as to produce from two to four stools a day. If the stools became more frequent he suspended the purgative. This treatment was continued until the febrile symptoms had ceased. The remedy he preferred was calomel with jalap in doses proportioned to the age of the child. This is the practice also of M. Bretonneau.

Emetics are highly recommended by various writers in the early stage of the disease. Dr. Eberle (*Dis. of Children*, p. 461) says, "If called sufficiently early, these should always be our first remedies." I have prescribed them in several cases, and have certainly thought them useful in the regular form, but must confess that like all other remedies I have used, they seemed to exert but little influence over the grave forms. In young children, in whom large collections of viscid secretions in the fauces occasion difficult respiration, an emetic of ipecacuanha is often serviceable in mitigating that symptom.

The antiseptic preparations of *soda* have been lauded by some persons as useful in the treatment of the malignant forms. I have not, however, met with any satisfactory evidence in their favor. I have used them in several instances, but as it has always been in conjunction with other means and particularly with stimulants, it was difficult to determine what effect to ascribe to the soda preparations, and what to the stimulants. My impression is, however, that they exert but a feeble influence in a grave case of the disease, and that they ought to give place to more important remedies, and particularly to the external use of cool or cold water, inunction, and stimulants.

Chlorate of potash has been recommended of late years by several authorities, and by some with high commendation. Dr. Watson dissolves a drachm of the salt in a pint of water, and gives it as a drink to the patient. I have made use of it in several cases, and am of opinion that it was decidedly beneficial in some in which the throat and mouth were very much inflamed and disposed to ulceration.

Inunction, employed as described in my remarks upon the treatment of mild cases, will be found of great service whenever the skin is very hot and dry, and particularly when the eruption is intense and accompanied with violent itching and irritation.

Baths; lotions; affusions.—I am disposed to believe that, on the whole, we derive more useful effects in grave cases of scarlet fever, from the judicious external employment of water, than from any other means of treatment. The particular mode in which it is to be made use of must depend on the character of the individual case. In some the warm, in others, the cold bath; cool, cold, or tepid, lotions; or affusions with water at various temperatures, must be applied according to the nature of the case. I shall refer first to the opinions of different authorities upon this subject, and then give the results of my own experience in the matter.

The warm bath is recommended when the cutaneous action is slow and imperfect, the pulse rapid and small, and the nervous actions slow or irregular, or in other words, in cases of an asthenic type, in which the disease assumes a low and typhoid disposition.

Lotions, by sponging with water at different temperatures, are highly recommended by many authors, and often afford the best means of modifying the condition of the cutaneous surface. They are most useful when the skin is intensely hot and dry, and should then be employed at a temperature of from 75° to 90° or 92°, according to the degree of the cutaneous heat, and according also to their effects at the moment. They are to be continued for several moments, or for half an hour even, until the heat is reduced and the restlessness of the patient moderated. To be of any service they must be repeated so soon as the temperature of the skin rises again after it has been reduced by previous sponging. Usually it is necessary to resort to them every hour or two hours, or even more frequently. It is scarcely needful to say that cool or cold lotions are to be used only when the reaction is strong and well-marked, and not when the skin is pale and cool, and the pulse feeble and rapid. Under those latter circumstances, lotions with warm or hot water, or warm or hot baths, in connection with internal stimuli, would be the proper remedies.

We come now to the consideration of another method of treatment, which has been asserted to be most efficient in the violent forms of the disease by several persons of high authority in medicine, while by others it is considered dangerous and improper. I refer to the use of affusions with cold water. The treatment was particularly relied on by Dr. J. Currie, of Edinburgh. Let it be observed, however, that Dr. Currie limits its use to cases to which he applies the term anginose, many of which, I doubt not from his description, ought to be classed as mild cases. He mentions another class of cases, which he thinks ought rather to be called "purpurata," characterized by "extreme feebleness and rapidity of the pulse, and great fetor of the breath . . . . . . The heat does not rise much above the standard of health. Great debility, oppression, headache, pain in the back, vomiting, and sometimes purging, accompany its rapid progress; the patient sinks into the low delirium, and expires on the second, third, or fourth day. . . . . The cold affusion is scarcely applicable to it, and the tepid affusion makes little impression upon it. In my experience, indeed, all remedies have been equally unsuccessful. It outstrips in rapidity, and it equals in fatality, the purple confluent small-pox, to which it may be compared." (*Currie's Med. Reports*, Philad. p. 277.) It is clear, therefore, that Dr. Currie, when he speaks of nearly invariable success in upwards of one hundred and fifty cases (p. 286), had to do, not with the malignant, or at least, not with the most malignant forms, for which we are seeking a remedy, but with cases of a mild form, or at most with those of the severe anginose type. Indeed, at page 294, we find the following remarks. "It has come to my knowledge, that in two cases of scarlatina, of the most malignant nature, the patients have been taken out of bed, under the low delirium, with the skin cool and moist, and the pulse scarcely perceptible.

In this state, supported by the attendants, several gallons of perfectly cold water were madly poured over them, on the supposed authority of this work! I need scarcely add that the effects were almost immediately fatal." I have been induced to enter thus much into detail, in regard to the use of cold affusions, because of the intrinsic importance of the subject, and because of the remarks upon it in the work of MM. Rilliet and Barthez, who bring forward Currie's success, as a strong argument in favor of their employment in that form of the disease in which cerebral symptoms predominate. Currie does not recommend them, however, except in cases in which the reaction is full and strong, as indicated by very great heat of skin, scarlet eruption, and rapid, but not feeble pulse. In the famous cases of his own two children, it is evident that the attacks were not malignant, for the skin was very hot (108° and 109° F.), and no mention is made either of stupor or delirium, much less of convulsive phenomena. Dr. Geo. Gregory, of London, whose opinions upon all matters connected with the eruptive fevers are of course worthy of great weight, says (*Lec. on the Eruptive Fevers*, edited by Dr. Bulkley, New York, p. 190) in relation to the use of cold affusions: "Sanctioned by my uncle, the late Dr. Gregory of Edinburgh, this plan has been amply tried in all parts of the world, but it has not realized the expectations of its proposer.

"The truth is that the cold affusion is applicable only to a small number of cases. It is adapted for young people with high anginose inflammation and a burning hot skin, without plethora, without depression of nervous energy; but it is inapplicable to the scarlatina of adults, accompanied with coma, phrenitis, or marked debility. It is wholly unfit for cases of cynanche maligna. It answers its purpose very well for the first day or two, but it is often impossible to continue its use. Lastly, it seems to increase the disposition to dropsy."

The evidence brought forward by Currie, Gregory of Edinburgh, and MM. Rilliet and Barthez, in favor of the efficacy of cold affusions in the treatment of severe cases of the disease, is such, however, as ought to call attention to this point, though my own impression is that lotions with cool or cold water are safer, more agreeable to the patient, more convenient in every respect, and quite as useful, as cold affusions. If employed at all, they ought evidently to be restricted to cases, in which the reaction is perfectly well-marked, in which the skin is hot and dry, the pulse, though frequent (150 or 160), strong, and the eruption not of too dark a tint. The child is to be undressed and placed erect or sitting in a tub, while four or five gallons of water, at from 60° to 70° F., are poured over the head and body. The good effects of the remedy are said to be an immediate reduction of the heat, a diminution in the rapidity of the pulse, which in one of Dr. Gregory's children fell in half an hour after the cold affusion from 160 to 120, a disposition to sleep and quiet, and, according to Dr.

Gregory, a seeming arrest of the throat-affection. These good effects of the affusions are transient, however, as the heat of skin and rapidity of the circulation return in the course of one or two hours. For this reason it is necessary to repeat them frequently, once in two or three hours at least, in order to render the effects permanent. Currie used fourteen affusions for one of his own children, and twelve for another, in thirty-two hours. These were not, however, all cold. Gregory used for his child five "good sousings," to use his own words, in twenty-four hours.

MM. Rilliet and Barthez give in the following words the conclusions of Henke in regard to the use of cold affusions: 1. Cold affusions are not adapted for a *general* method of treatment. 2. The slight, or simply inflammatory forms, do not at all demand so energetic a treatment. 3. Their employment must be reserved for cases in which the disease is epidemic, and accompanied by intense heat and dryness of the skin, with smallness and acceleration of the pulse, and for those in which the cerebral symptoms are very violent and characterized by great restlessness, alternating with drowsiness, commencing from an early period of the disease. Scarlet fever, under these circumstances, is so dangerous, they say, and so often mortal, that recourse ought to be had to all curative means, and in children the cold affusions are much more strongly indicated than bleeding. (*Loc. cit.* vol. ii, p. 653.)

Believing that evidence of the effects of any plan of treatment in grave cases of scarlet fever must be acceptable to all who feel an interest in the progress of medicine, I insert at this place an accout of the employment of cold lotions, by Dr. Hiram Corson, of Conshohocken, Montgomery County, Pennsylvania. The cases narrated occurred in his own practice, and were kindly communicated by letter, at my request. Dr. Corson wrote to me as follows, in July, 1847:

"Dear Doctor,—

"Scarlet fever is a disease that has prevailed very much in our region during the last seventeen years, and has caused me much thought and anxiety. It will give me great pleasure to make you acquainted with the *results* of a plan of treatment, which I owe mainly to Doctor Samuel Jackson, formerly of Northumberland, now of your city, who first put me in the way of treating the disease successfully. In 1833, I treated the disease, which, however, was not malignant, very successfully, with iced drinks, moderate purges, and slight irritation externally upon the throat, and thought the practice peculiar to myself, but afterwards saw in the May and August numbers of the Am. Journ. of Med. Sciences, the communications of Dr. Jackson. Encouraged by these, I prepared to try the cold externally, when a most unfortunate trial, by a neighboring physician, so alarmed the people about the application of cold, that I could not prevail upon them to suffer the trial. From 1838, until within the last two years, we have annually had the scarlet fever for some months, and my treatment, with the exception of iced drinks sometimes, and cold to the head occasionally, was like that in general use, until August, 1844. At that time I was called to a child eight months old, who had been sick two days. There was great swelling of the glands of both sides of the neck, hot skin, frequent pulse, but no eruption; slight discharge from the nose; the glands not easily seen upon the inside, but the drinks came back through the nose sometimes, and it could not take more than one draw at the breast, without dropping the nipple, because of the obstruction in the nostrils impeding respiration when the mouth was closed. I stated candidly to the mother that I had never saved a child in that condition, and of that age, by the old treatment, and recommended *ice externally and internally*, cold water to the head, and no medicine. I could urge nothing upon the score of experience, but she agreed. Lumps of ice were folded in linen cloths and held night and day upon the two sides of the throat; while a small thin piece inclosed in white gauze was held in the mouth. In less than three hours improvement was manifest in the ability to swallow. The swelling of the glands, the heat, and the frequency of the pulse all regularly diminished, and in two days the child could nurse well and was out of danger.

"The next severe case occurred in about two weeks. It was one of the most intense scarlet eruption, with tumefaction and ulceration of the tonsils, vomiting, coryza, great frequency of the pulse, excessive restlessness, and swelling of the external glands. The heat was intense; there was heaviness amounting almost to stupor. My treatment was a kind of half and half: emetics, purgatives, cold externally and internally. Being but half satisfied with myself, my course was vacillating, and inefficient, and I at length called in a friend, who turned the scale in favor of irritating gargles, and our patient died. I was mortified and provoked, and determined to act out my convictions at the next opportunity. A few days after I was called to two boys of five and seven years of age, who had been blistered upon the throat, legs, and arms, and had had hot drinks, calomel purges, etc. etc., and who were discharging copiously from the nose, and were almost deaf. Their countenances were sunken, the throats gangrenous, pulse above 150; their appearance was that of persons in typhus fever. I expressed my fears of the blisters, predicting that they would be all gangrenous in twenty-four hours, and that they would be likely to destroy the patients. I had cloths dipped in iced water wrapped round the neck, ice was put into the mouth, and cold water poured upon the heads, which were much affected. The throats were filled with ropy mucus, which was expelled through the mouth and nose during the coughing which attended efforts to vomit. The palate was literally destroyed by gangrene. A few hours produced an amendment. The blisters mortified extensively, and though both children recovered from the disease, one died two weeks afterwards from the sloughing of the throat and neck from the blisters.

"I now treated all the cases that occurred with cold externally and internally; moving the bowels with equal parts of cream of tartar and jalap. The cases were seen early and easily subdued, and it seemed to me as though the remedy was very efficient, or that my patients had a mild disease. That the latter was not the case, however, I thought probable from the fact that in my region, many cases differently treated died; while in Norristown, only four miles distant, children from one to twelve years or more, were swept off after an illness of only two or three days, the deaths being evidently produced by disease of the brain.

"On the 16th July, 1845, I was called to see a little girl four years and nine months old. She had been sick a day or two. The case began with vomiting. The eruption has been out since morning (now, 6 P. M.); redness the most intense all over that I ever saw; pulse as rapid as it could be to be counted. The mother had been alarmed during the last few hours, in consequence of delirium and jerking, which she feared was the prelude to convulsions. There was tumefaction of the submaxillary ganglions; tongue furred, with projecting red points; breath hot and offensive. When she found some one holding her wrist, she started from her dozing state, and being somewhat afraid of the 'doctor,' went off immediately into one of the most terrific convulsions that I ever saw. It lasted, in spite of ice to the head, or rather iced water *constantly* poured upon it, almost half an hour. I stayed with her, had her undressed, and placed two nieces of mine (her mother being one) by her side. A large tub of water with cakes of ice, at least a peck, floating in it, was brought into the room, and during the *whole* night, these two persons bathed her from head to foot with the water from this tub, applying it by means of large sponges. It was to me a most painful case (independent of the convulsions), but in order to be certain that I had a case fit for a trial of the ice, I had my brother (a physician practising at Norristown, where the disease was very fatal) brought at 10 P. M., to see the case, and to say whether it was the same as those that had for a few weeks been carrying off some of the finest children in Norristown, and carrying terror into every family. He assured me that it was one of the most violent character, and that she would in all probability not live till morning. She was at this time free from convulsions, but in a muttering delirium. As I had perfect control in the case, I assured him that she should live if I could quench the fire that was burning out her vitals, by the use of ice. Not a moment did the attendants whom I had placed by her intermit their labors. Before midnight reason had returned, and her mother said she was more herself than she had been during the whole day. I had gone away, but returned at sunrise, and found her cooled off perfectly. There was scarcely the least appearance of eruption, the skin was cool, the head cool, the intellect clear, and the pulse moderate in frequency and force. She had been unable to drink for many hours, and her tongue, which had been very much cut during the convulsion, was so swelled and sore, that I could obtain no view of the throat. I now directed the mother to intermit the sponging, doing it only once in every two hours, until I returned. My return was delayed until four P. M., when I found that the heat of skin, frequency of pulse, eruption, and delirium had all returned. She was moving her hands as if feeling for something, slowly protruding and withdrawing the tongue, and muttering. She did not notice her mother's questions, and was apparently unconscious to all that was going on. We threw on the water, ice-cold, in the utmost profusion, and lapped cloths dipped in the water around the neck, changing them every minute or two. We poured it upon the head constantly, holding a large basin under to catch it. In one hour, reason returned. We continued it until the eruption almost disappeared, until the child shrank from it, and until she was ready to shiver with cold. I now gave her cream of tartar and jalap, directed the water to be used just as was needed to keep down the heat, and had no farther trouble with her. I forgot to say that so soon as she could swallow, cold drinks and ice were kept in the mouth. She took no more medicine. The wounds in the tongue healed up kindly.

"There were two younger children in the family, both of whom were attacked a few days after, while apparently in good health, with vomiting and the same symptoms as in the first case. The throats were red and swelled, etc. Cold cloths were wrapped around the neck; they were purged with jalap and cream of tartar; as the heat of skin and eruption appeared, ice water was profusely applied to the whole body, so as to keep down the heat, and allow but a very moderate eruption to show itself. They were well in a few days without a bad symptom. It was now mid-winter. The cases followed each other rapidly. I treated them all in the same way, and *all* with like happy results. The disease had a wide range, extending from the Schuylkill across the highlands between Norristown and Doylestown, and was in that range very destructive in many families. There was much alarm, and I was called two miles back of Norristown to a girl about eleven years old. The eruption had been out about twenty-four hours. The throat was swelled and covered with white patches (generally called ulcers); tongue dry, hot, and red; skin hot as skin could be; and, what to me characterizes the most malignant cases, the eruption instead of being of a bright scarlet, was of a purple red, like the congestion sometimes seen in the faces of old drunkards. There was great oppression, not *difficulty* of breathing, but a state like that which exists when a person is deathly sick but cannot vomit; with extreme restlessness and jactitation. The disease had been so fatal, that the mother thought the case almost beyond remedy, but when I told her that the cold had proved successful she was eager to try it. It was 8 o'clock A.M. The girl was stripped, and the ice water applied all over. Ice was lapped around the neck, and positive directions given to continue the applications without intermission until I returned. It was about four miles from me, and I did not return for seven hours. The moment my eyes rested upon her, I knew that we had done *too much*. She was white as the sheet upon which she lay. The neighbors had been in and desired the mother to desist, that 'she would kill her,' but she had been true to her trust. The child was apparently bloodless, covered with 'goose-skin,' and shivering with cold. Her pulse was *small* and much less frequent, but not weak or fluttering, and she was sensible. (I forgot to say that in the morning she was quite flighty.) I told the mother we had used rather more cold than was necessary, but that if we left it off now she would probably do well. I omitted it for two hours, and gave nothing. At the expiration of that time, the heat, and with it the eruption, showed themselves, so as to cause me to direct the sponging to be used just so as to keep them in check. The ice was kept constantly to the neck, water frequently poured over the head. I had no more trouble with her, although she desquamated from head to foot.

"Six other children in the family took the disease. Five of them had the ice and ice water used upon them, and all did well. I gave none of them any medicine except a little cream of tartar and jalap, to move the bowels moderately. I gave this combination because it is pleasant to children and easily swallowed. The sixth case was a very mild one, so that the mother merely gave it a little castor oil, and it did well, and seemed perfectly recovered in a few days. Indeed the attack was so mild, that it would not have been detected as scarlet fever, if it had occurred at any other time. It was attacked with dropsy and an affection of the lungs, about two weeks after, lingering for several weeks, and finally died of pneumonic disease.

"I suppose I have attended more than a hundred cases of scarlet fever of every grade, since I began the cold treatment. In no instance where I had it fairly applied did it fail. Indeed I have lost but two patients since.

"In every variety of sore throat and quinsy, in summer and in winter, my treatment is ice around the neck; or, when the nurse is faithful, iced cloths, renewed as soon as they approach the heat of the neck.

"In no single instance have I seen dropsy follow scarlet fever that had been treated by cold affusion. I have never seen it occur except after the mildest cases of the disease, those that had probably only needed a mild laxative."

I wrote to Dr. Corson again, in the early part of the year 1853, for the result of his experience in the same treatment since the date of his first letter (July, 1847). Dr. Corson informs me that an epidemic occurred in 1852, during which he had ninety cases, of which ten died. Of these, two, he says, died of the sequelæ. They were not seen by him until one had been laboring for several days under inflammation of the pleura, while the other had disease of the heart and dropsy. In these two cases and another fatal one in which the prostration was extreme, ending fatally a few hours after Dr. Corson had seen it, no cold applications were made use of. In most of the other cases also he had not the means, he says, owing to the scarcity of ice and cold water, of carying out his treatment. His present opinion in regard to the use of cold water is expressed in the following language: "The result of my observations but confirms my former experience in relation to the good effects of cold affusions and cold topical applications in this disease; but I confess my great ignorance of the proper application of this remedy. It needs much knowledge of the physiological effects of different modes of application. Many cases need the continuous application for many hours,—such as those where the eruption is vivid, heat great, throat swelled, etc.; while those where the surface is but moderately hot, the extremities cool, and in which cerebral symptoms are manifest, cold sponging followed by quick and free rubbing with crash, and repeated every fifteen or twenty minutes; or the cold sponging followed by wrapping in a blanket so as to produce free perspiration, cold water being poured *continuously* upon the head for hours, with cold applications to the throat, would perhaps be the most proper plan. But, I repeat, I am not well skilled in the best modes of application, but it seems to me that in the hands of an adept, it could be adapted to every condition of the disease."

It appears to me very clear, if I may be allowed to criticise the results of Dr. Corson's experience, that the cases he has seen since his first letter have had the effect to lessen somewhat the enthusiastic confidence in the treatment by cold, which is so strongly expressed in his first communication. He still retains great faith in the treatment, but it would seem that his results, as detailed in his last communication, have not been so favorable as they were before. He has probably had to do with a worse epidemic, and has found, as all before him have, that, in malignant cases, in which the febrile reaction is imperfect and the symptoms low and typhous in character, cold used indiscriminately is very dangerous, and used even in the best and most judicious mode, but too often, like everything else thus far discovered, inefficacious against this fatal scourge.

My own experience in the use of cold applications has not been very extensive as I have preferred the use of the tepid affusion bath, of immersion baths, and of lotions with tepid or cool water. I have never employed the cold affusion over the whole body, and never saw it employed but once. In that instance a single bucketful of water at 70° was poured over the child, but as it was not repeated, no good effects, beyond a very transient reduction of the heat and quiet for a short time, were produced. In another instance I made repeated affusions upon the head with water at 70°, pouring at one time seven bucketfuls upon the part. This was a case attended with coma, strabismus, and spasmodic retraction of the head. In addition to the affusions, cloths dipped into ice water, were kept applied the greater part of the time. These means, especially the affusions, were evidently advantageous, and the child recovered.

I have made use of lotions with cool water (70° to 72°) in three grave cases. In two they were evidently useful; in one they did no good, and were perhaps injurious, as I believe now that the case might have been better treated with prolonged warm baths at a temperature of 92° to 95°, cold to the head, and internal stimulation. The latter case was one in which the patient had two convulsions on the first day, and one on the second. The pulse rose at once to between 160 and 170; the head and trunk were very hot, whilst the extremities were coolish; the child was either excessively dull or comatose. Cloths wet with iced water were kept constantly upon the head, and the body, and occasionally the limbs were sponged with cold water. The internal remedies consisted of carbonate of ammonia and milk-punch. The patient improved decidedly on the third day, so that the pulse came down to 152, the intelligence returned, though the child was still very drowsy and heavy, and the case looked quite promising. On the fourth and fifth days, the throat-affection came on; the neck and throat swelled enormously, the cervical lymphatic glands became very large, the nasal passages discharged streams of offensive grumous pus, the ears ran copiously, the fauces became pseudo-membranous, the deglutition grew worse and worse, until at last it was impossible, and the child died on the middle of the sixth day, a mass of the most disgusting and offensive disease. One of the grave cases in which the cool applications proved useful, occurred in a hearty, vigorous girl, twelve years of age. On the third day of the attack, the symptoms were as follows. The pulse was between 160 and 170, small and quick; skin intensely hot; eruption very copious and of a dark red color, tending to violet; capillary circulation slow and languid; tongue black, and covered with a hard dry crust; teeth and lips dry, and covered with dark incrustations. There was very great agitation and restlessness, with constant moaning and complaining, and total insomnia. Under these circumstances, I directed the nurse to sponge the head and extremities of the patient with water of the temperature of the room (68° to 70°). As the water became heated by contact with the skin, small pieces of ice were put into the basin so as to keep the temperature at the point mentioned. At the end of four hours, the washing having been continued all the time, I found the patient decidedly more comfortable. The pulse had fallen to 140, and increased in volume; the heat of skin was much reduced; the color of the eruption had improved, having become much more scarlet in tint; the capillary circulation was more active; the agitation and restlessness had very much moderated, and the child had slept somewhat at short intervals. This treatment, in conjunction with the internal administration of the solution of chlorinated soda, and small doses of spirits of turpentine, was continued for several days, the sponging being used whenever the heat and restlessness were great, and the pulse very rapid. The child convalesced about the end of the third week, but was unfortunately seized with symptoms of hydrocephalus on the twenty-fifth day, and died in twenty-three hours, after the most frightful convulsions I ever saw.

Without attempting to describe more particularly my experience in individual cases, I shall proceed to give a summary of what I believe to be the best mode of employing the class of remedies now under consideration (baths, lotions, and affusions). Of the various means that I have employed or seen employed in grave cases, these alone, either singly or in connection with the use of stimulants, have seemed to me to exert a manifestly beneficial influence upon the disease. In cases attended with low delirium, stupor, or coma, or with convulsive phenomena, in which the extremities are cool or coolish, even though the head and trunk may be intensely hot, and where the eruption is scanty and imperfect, or copious and of a dark and purple tint, the warm bath at 95° or 96°, continued for twenty minutes or half an hour, and repeated every two or three hours, in connection with the internal employment of stimulants, as ammonia and brandy, and with cold to the head, either by means of wetted cloths, or by a prolonged cold douche, and occasionally two wet cups on the head, afford the best means of treatment that I am acquainted with. Under these circumstances, the warm bath has always appeared to ameliorate for the time being the condition of the patient. From being entirely comatose, or exceedingly heavy or delirious, the child has, while in the bath, often awakened from its stupor and regained a slight degree of intelligence, so as to open its eyes, look round, and drink freely. In cases attended with convulsions, the warm bath, with cold cloths to the head, or better still, a prolonged cold douche upon the head, will very generally cause the cessation of the convulsive symptoms. Unfortunately, however, the effects of this treatment are only too frequently but transient, for, though the heat of skin has remained rather less for some time after the immersion, the coma and sometimes the disposition to convulsions have very soon returned. The same statements are made by M. Gueretin (*Loc. cit.* p. 302). Nevertheless, these means, the frequently repeated warm bath, cold to the head, and internal stimulation, offer, I believe, the best means that have as yet been discovered of treating those malignant cases in which, within a few hours from the moment of invasion, the patient lies before us comatose or convulsed, stupid or delirious, with a scanty or dark-colored imperfect eruption, with coolish or cold extremities, and with small, feeble, and very rapid pulse.

In cases of scarlet fever not quite so severe as those just now alluded to, in which the pulse, though very frequent, remains somewhat full and strong, in which the cutaneous heat is very great and properly distributed, in which, though the patient is heavy and dull, he is not comatose nor convulsed, or if convulsed only momentarily so and that from the intensity of the febrile reaction, and in which, if delirium exists, it is slight and of a higher kind than in the previous class of cases, the most suitable treatment is the following. The affusion bath of vinegar and water, as recommended in my remarks upon the treatment of mild cases, should be used every two or three hours, at a temperature of from 90° to 95°; after the bath the child should be wrapped in a cotton sheet, and placed in bed in a light blanket, for twenty minutes or half an hour; when dry, the body should be rubbed all over with the ointment already described. The head is to be kept cool by means of wetted cloths. The only treatment necessary is a mild laxative, iced drinks, as lemonade, orangeade, or mineral water, the chlorate of potash solution already spoken of, neutral mixture, and sweet spirits of nitre, or spirits of Mindererus. When, from any cause, as want of the necessary conveniences, or from the terror it sometimes inspires in the child, the affusion bath cannot be employed, we ought to make use, instead, of tepid or cold spongings and of inunction.

In yet milder cases than those just described, in which though the pulse is frequent, it is quite full and strong, in which the eruption is abundant and bright in tint, and the whole cutaneous surface hot and dry, and in which the nervous symptoms are not of a very threatening character, the only external means necessary to be used, are an occasional tepid immersion bath, or better still, a warm affusion bath, or else frequent spongings with tepid or coolish water, and frequent inunction. The internal means should consist, as in the previous class of cases, of cool and refrigerant drinks and simple diaphoretics.

Tonics and stimulants.—In certain grave cases of scarlet fever stimulants are required from the very commencement of the attack,—at least such is the opinion of some of the best medical authorities, and such also is the conclusion to which experience has brought me. Dr. Gregory, of London (*Loc. cit.* p. 187), in speaking of the cases of "angina maligna gangrenosa," in which the eruption is undeveloped, and which, from the onset, are characterized by depression, or collapse of the nervous system, says: "Common sense here dictates an early recourse to stimulants,—to wine, brandy, cordial draughts containing ether, camphor julep, aromatic confection, and tincture of bark, in such quantities and doses as the stomach will bear, and the age of the patient justify. On this point there is no room for cavil or doubt." Dr. Wilson (*Dis. of the Skin*, Am. Ed. p.

93) remarks that the "vast depression of the powers of the nervous system that exists in scarlatina maligna indicates a tonic plan of treatment." He proposes quinine, with infusion of roses, dilute sulphuric acid, etc. He states also that the "tonic and nutritive properties of wine or good beer render them invaluable remedies in these cases." Dr. C. Morris, of this city (*Loc. cit.* p. 94), says, "The malignant form requires that the first symptoms of failure of vital power should be met by a prompt resort to the use of capsicum, quinine, wine, and nourishment." Dr. West (*Loc. cit.* p. 540), in speaking of the use of ammonia almost from the onset of the disease, remarks, "It is a practice which has been recommended as universally applicable, and which (though the remedy does not deserve the indiscriminate encomiums that have been lavished on it) you will do well to follow, whenever the pulse presents the characters of great frequency and softness combined." In cases of scarlet fever, therefore, in which, from the beginning, the pulse is small, feeble, and rapid, the cutaneous action imperfect, as shown by a scanty or irregular eruption, or by one of a dusky or purple color, in which the movement of the blood in the capillaries is sluggish, in which the temperature of the body is uneven, the extremities being cool, whilst the head and trunk are hot, in which the patient is dull, stupid, comatose, or affected with low delirium, and in which low nervous symptoms, as irregular muscular movements, excessive jactitation, automatic movements, or subsultus tendinum, are present, it is evidently proper and necessary to make use of stimulants and tonics. The stimulant most highly recommended in the early stage is carbonate of ammonia; quinine, bark, the different acids, wine and brandy, may also be made use of. It ought not to be forgotten, however, that while stimuli are being employed, the hot, warm, or tepid bath, prolonged for some length of time, and repeated every two or three hours, or spongings, with cold to the head by means of wetted cloths or by a cold douche, and frequent inunction, constitute quite as important a part of the treatment as the stimulants.

In slow and tedious cases of the disease, which, perhaps, were of an inflammatory type in the beginning, adynamic symptoms frequently occur after the attack has been going on for one or two weeks. The pulse becomes frequent and small, the skin cool and moist, or hot and cold by turns, the tongue is dry and cracked, sordes collect upon the teeth, and there is jactitation, muttering delirium, and various nervous symptoms, which all clearly indicate great exhaustion of the vital powers. Under these circumstances it is necessary to resort to whatever means are likely to uphold the constitution, and impart to it strength to resist the slow disease which tends to destroy it. With this view the diet ought to consist of milk preparations, and of light animal broths, with bread, if the child will take them. At the same time wine-whey in proper doses, and at fixed periods, ought to be given;—or the whey may be mixed with arrow-root water,—or wine or brandy may be given in simple cold water. If the prostration is very great, full doses of brandy must be used. We may resort also to the internal use of quinine, in the dose of a grain three or four times a day, to a child two or three years old, or to the cold infusion of bark. The aromatic spirits of hartshorn is useful in doses of ten or fifteen drops every two or three hours; or the carbonate of ammonia in emulsion; or infusion of serpentaria, which latter is highly spoken of by some of the German authors. For my own part, I rely chiefly on diet, wine and brandy, and quinine. This treatment should be continued so long as the adynamic symptoms last. In a few cases of this kind, I have obtained good effects from the use of chlorate of potash, in the dose of two grains, to children of three or four years old, every two or three hours. The solution of chlorinated soda has also proved useful. I have given from five to ten drops of it every two or three hours.

Treatment of the Angina.—The pharyngeal inflammation requires a chief share of our attention in all grave cases of the disease.

It is scarcely necessary, after the previous remarks on bloodletting, to say much in regard to its employment in combating this element of the malady. It may be used with great caution in the very earliest stages, while the reaction is still full and strong, though of late years I have very rarely employed it. I should prefer leeches to bleeding, and believe that about four ounces are as much as ought generally to be taken from a child three or four years old. In grave cases of a malignant type it has been found not only that the loss of blood from leeches is injurious to the patient, but that the leech-bites are very apt to inflame badly, to ulcerate, and even to become gangrenous, so that they ought never to be made use of in such cases. Moreover, the bites often bleed for a length of time after the removal of the leeches, the blood oozing out by a process of leakage, and rendering it difficult to arrest the hemorrhage.

When the external swelling is considerable, benefit is sometimes derived from the steady application of warm poultices to the part. They should be inclosed in portions of thin soft flannel, and secured by means of a very light cravat; they must be renewed every two or three hours. The reader's attention is called to the use of cold applications to the throat, as recommended by Dr. Corson, in the letter appended to my remarks on baths and lotions. In cases attended with great heat of skin and fully developed pulse, cold applications to the throat, consisting of pieces of ice wrapped in flannel, and applied behind the angles of the jaw, or of cloths wetted with iced water, may very properly, and, I believe, advantageously be made use of. In one case in which I made use of the cold cloths, they were evidently beneficial. In another case, in a boy between eight and nine years old, already referred to at page 534, there appeared on the third day threatening anginose symptoms. On the fourth these had increased, and by the night of the fifth day had reached such a height as to make me almost despair of the child's life. The violent pharyngeal inflammation was attended with excessive swelling of the tonsils and with œdematous infiltration of the submucous tissue, while externally, the cervical glands were enormously enlarged and as hard as paving-stones, and the subcutaneous tissues of the front and lateral regions of the neck were packed and hard with acute œdema. The general symptoms were most threatening. Owing to the swelling of all the parts composing the neck, the respiration was so much interfered with as to cause the development of dangerous asphyctic symptoms. The pulse, which, for the three first days, had been running at 168, had fallen on the fourth to 140, and on the fifth to 128; the skin was hot and dry, and upon the face had assumed a dark bluish tint; there was almost constant muttering delirium and a degree of tossing and violent jactitation, painful to witness. The swallowing was so much impeded that it was with great difficulty that the patient could take the thinnest liquids. Up to this time the case had been treated with inunctions, cold drinks, and a febrifuge containing spirits of Mindererus and sweet spirits of nitre. In the midst of these threatening symptoms, and when we had almost lost hope, my father, who saw the case with me, proposed abandoning all drugs, and making use of cold applications externally and giving stimuli. Accordingly a large towel was wrung out of iced water and wrapped around the neck, and weak wine and water was given as often as the child could take it. The cloth was dipped afresh into the water every few minutes. This treatment was commenced about 1 A. M., and carried on steadily all night. At 9 A. M. it was evident that the symptoms had somewhat improved, and by the afternoon of that day, the patient was greatly better. The improvement consisted principally in a moderation of the pharyngeal swelling, so that both respiration and deglutition were much easier. The dark color of the face had lessened; the pulse had risen in frequency and was stronger; and the delirium and excessive jactitation had almost disappeared. On the day after this, the external cervical swelling continued very much the same, except that the œdema had notably diminished. The pharyngeal swelling had disappeared, the tonsils having regained their natural size, but the whole pharynx was covered with a thick mould of white exudation. The cold application, which of late had been used more sparingly, was now discontinued; the fauces were touched with a solution of nitrate of silver of ten grains to the ounce; broths, milk, wine-whey, and wine and water were given for nourishment, and the patient slowly recovered, after having had a large suppuration just above the inner end of left clavicle.

A great variety of local remedies have been proposed by different authorities. The best of all is, almost without a doubt, the nitrate of silver, applied in solution. The strength of the solution varies almost indefinitely, some employing a caustic, and others a weaker one. Of late years I have generally made use of one of twenty grains to the ounce, but many excellent writers assert that one of forty, and even sixty grains to the ounce, is better. Powdered alum also, and solutions of sulphate of zinc or copper, are very much employed, but they are not, in my opinion, to be so much depended upon in a bad case as the nitrate of silver.

Cauterization of the throat, with the view of arresting the formation of the exudation, so useful and important in primary pseudo-membranous phraryngitis, seems to be of doubtful propriety in this disease. M. Gueretin (*Loc. cit.* p. 300) is of opinion that cauterization increases the phlogosis, augments the tumefaction of the ganglions, and aggravates the fetidity of the breath. M. Cazenave, on the contrary (*Abreg. Prat. des Mal de la Peau*, p. 56), advises the early touching of the diphtheritic patches with muriatic acid or nitrate of silver, in order to modify the peculiar inflammation. He also states that M. Biett employed habitually a mixture of equal parts of lemon-juice and honey. MM. Rilliet and Barthez recommend an application consisting of equal parts of honey of roses and muriatic acid. Cayenne pepper in infusion or substance has been recommended by different authors. Dr. G. B. Wood (*Loc. cit.* vol. i, p. 408), thinks that it exercises a peculiar and very happy influence "when the pseudo-membranous or gangrenous patches are observed in the fauces, and when the color of the mucous membrane is dark red." He mixes the powder in water, and applies it to the fauces by means of a large camel's hair pencil. When the breath is very fetid, the liq. sodæ chlorinatæ, diluted with eight to ten parts of water, is said to be very serviceable.

In the use of any of these preparations in children, it is necessary to apply them to the fauces in the manner described in the article on idiopathic pseudo-membranous pharyngitis. When viscous secretions collect in the fauces in such quantity as to cause serious annoyance to the child, and embarrass the respiration, they ought to be removed by means of a sponge mop, or camel's hair brush. This point in the treatment is a very important one, especially in young children. I believe that I have rescued more than one patient by going three or four times a day, to make use myself of means by which to remove from the fauces the viscid, glue-like secretions, the purulent fluids, and the masses of pseudo-membranous exudation which collect in and occlude those passages, and which the child often cannot, by any effort of its own, get rid of. The best mode of effecting this object is by the use of mops, made of sponge or rag, fastened to a stick or whalebone, or by the injection from a small syringe or elastic bottle, of detergent washes or gargles into the throat, the mouth being held open and the tongue depressed by the handle of a spoon. One of the best washes for this purpose is made of a strong decoction of green tea containing alum; or we may employ sage tea and alum; or honey of roses and borax, mixed with water; or capsicum tea; or, what is highly recommended by Dr. Watson, as one of the best, a solution of common salt. When coryza is present, the nasal passages should be cleansed by means of camel's hair brushes, or by the injection of some of the mild washes just referred to, and then freely anointed with sweet oil, or some mild ointment, or they may be touched with the wash used for the throat. To perform these little offices for the child almost always requires force, but they are followed by such comparative ease and comfort, and I doubt not, such mitigation of the disease, that they ought to be insisted upon.

For the *otorrhœa* which sometimes occurs, it is seldom necessary to do more during the violence of the attack, than to cleanse the ears twice or three times a day, by syringing with warm water and castile soap, or with a weak solution of alum. After the violence of the attack has subsided, this complication should be treated as in idiopathic cases.

Treatment of the Dropsy.—In slight cases the only treatment necessary is the use of some mild purgative, as castor oil, magnesia, or a small dose of calomel, warm baths from time to time, minute doses of antimony and sweets spirits of nitre, a simple diuretic, as cream of tartar or lemonade with sweet spirits of nitre, carefully regulated diet, and strict confinement to bed.

In severe cases, on the contrary, marked by considerable fever, and in which the urine is scanty, high-colored, and loaded with albumen, or in which it is dark-colored, owing to the presence in it of blood, the treatment must be more active. Depletion is recommended under these circumstances by nearly all the best authorities, some proposing venesection, while others prefer cupping or leeching over the loins. Without pretending to assert that bloodletting is unnecessary in this kind of dropsy, I will merely state that I have seen a number of children recover from it without any depletion whatever, and when the subject has been already much reduced by the previous illness, and where the blood is anemical and thin, I should certainly hesitate about drawing blood, unless the symptoms were very severe and threatening. If, however, the patient is not very pale and weak, and if the dropsy have attacked the internal cavities or brain, or is threatening the brain, it would be most prudent to draw blood. In such cases I have of late years employed leeches to the loins on several occasions, and generally I have thought with benefit.

After or without depletion, the treatment should consist in the use of active cathartics, unless there be some evident contraindicating condition present, of warm baths, of diaphoretics, and of counter-irritants applied frequently and with some perseverance over the loins. The patient should always be kept strictly confined to bed, and to a light and simple diet. The best cathartics are cream of tartar and jalap; sometimes, especially when bilious symptoms are present, calomel, either in combination with or followed by some other cathartic; and rhubarb or aloes. The saline purgatives are condemned by most writers on account of their diuretic action, which is thought to increase the already irritated circulation of the kidneys. For my own part, I have generally made use of moderate doses of cream of tartar and jalap, given repeatedly until abundant watery stools were procured. Dr. West (*Loc. cit.* p. 477), contrary to most writers, states that he has "not found as much advantage from the employment of cathartics as from the use of diaphoretics." My own practice, after opening the bowels freely and copiously, has been to make use of diaphoretics, and particularly of small doses of antimonial wine or syrup of ipecauanha and sweet spirits of nitre, taking care to avoid nausea. Warm baths ought never to be forgotten. They may be used every night, or if the patient be too weak or too irritable for this remedy, we may substitute mustard foot-baths.

Diuretics are opposed by most writers in the early stage as injurious. After moving the bowels freely, and reducing somewhat the heat of skin and the frequency of the pulse by antimonial wine or ipecauanha, and by the warm bath, I have almost always made use of them, and never, that I am aware of, with any other effect than a beneficial one. The ones that I prefer are the cream of tartar and juniper berries, one drachm of each of which may be infused in half a pint of boiling water, and the whole of the clear fluid taken in the course of the day; or tincture of digitalis and syrup of squills with acetate of potash, as follows:

℞.—Potass. Acetat.,	℈ij.
Tinct. Digital.,	gtt. xlviii.
Syrup. Scillæ,	ʒi vel ij.
" Zingib.,	ʒvi.
Aquæ Fluvial.,	℥ij.—M.

Give a teaspoonful every three hours to a child three or four years old.

One of the best diuretics, and one that I have often employed of late with much satisfaction, is the compound spirits of juniper, with nitre and bitartrate of potassa, as follows:

℞.—Potass. Bitart.,	ʒi.
Spts. Junip. Comp.,	ʒii.
Spts. Aether. Nitros.,	ʒi.
Syrup. Simp.,	ʒv.
Aq. Fluvial.,	℥ii.—M.

Give a teaspoonful every two hours.

When the case is attended with fever and dryness of the skin, I often combine with the above some syrup of ipecac.; when, on the contrary, the patient is languid and exhausted, I substitute spirits of Mindererus.

In giving digitalis, its effects upon the pulse and nervous system must of course be closely watched.

In cases in which the brain is attacked, as indicated by violent delirium, coma, or convulsions, depletion ought, as a general rule, to be made use of. Venesection is usually most proper, but if this cannot, for any reason, be employed, local bleeding by cups to the back of the neck or to the loins may be substituted. Active doses of cathartics ought to be given immediately after depletion, and if the symptoms are very urgent, enemata may be employed to hasten their operation. Warm baths are of great service in the treatment of this complication. They promote diaphoresis, and thus moderate the febrile movement, and assist in removing the effusion. After these remedies, or in conjunction with them, diuretics are to be chiefly relied on. Those already recommended will answer perfectly well here also. In one case that came under my observation, however, in which there was an almost comatose state with total suppression of urine for five days, the stomach was so irritable that no remedy scarcely could be retained. The child, nevertheless, recovered finally, under the use of watermelon-seed tea, given frequently in small quantities, mustard foot-baths, and blisters behind the ears. (For further information in regard to the treatment of hydrocephalus following scarlet fever, the reader is referred to the article on hydrocephalus.)

Prophylactic treatment.—It has been asserted that belladonna, used by persons exposed to the contagion of scarlet fever, has the power of imparting perfect or nearly perfect immunity from its attacks. My own experience in regard to this matter is so moderate, from the fact that I have not resorted habitually to the belladonna as a means of prevention until lately, that any opinion I can offer is worth but little. I have, however, used it a good deal during the last four years, and, though I have no exact data by which to form an opinion, the impression I have received is decidedly favorable,—so much so that I always make use of it now when the cases are severe, and especially when the type of the epidemic is dangerous. In one family, in which I gave it to nine children exposed directly to the disease, either from their being in a house in which it was prevailing, or in the very room of the patient, eight escaped the disease entirely, and the one who had it, had it very mildly and safely. From the evidence brought forward in the European works that I have seen, its efficacy seems to be left in considerable doubt. MM. Rilliet and Barthez are of opinion, however, that it is at least worthy of trial. M. Cazenave (*Loc. cit.* p. 58) states that "M. Biet saw the disease reign epidemically in one of the lofty valleys of Switzerland, and respect, almost without exception, children to whom the belladonna had been administered." MM. Guersant and Blache (*Loc. cit.* p. 180), after citing various accounts of its use, conclude that "these trials ought, undoubtedly, to be continued." According to Dr. Condie (*Loc. cit.* pp. 441, 442), Dr. Irwin made an extensive trial of its prophylactic powers in South Carolina, and found that of two hundred and fifty children who took it, less than half a dozen had the disease, and that very mildly. Dr. McKee, in an extension of the same epidemic, used it with like success.

Dr. Condie himself made use of it, "but although redness and dryness of the throat, and a diffuse scarlet efflorescence were produced in the majority of the cases, we never found it in any, to exert the slightest influence in mitigating the character, or preventing the occurrence of scarlatina. The experiments were made during the prevalence of the disease, and in numerous instances the subjects of them were attacked. In one case the efflorescence was kept up by the use of belladonna, forty-eight hours; in a week afterwards, this individual took the disease in its most violent form, and died on the fourth day."

By far the most thorough and careful examination of this interesting and important matter that I am acquainted with, has been made by Dr. F. Peyre Porcher (*Charleston Med. Jour. and Rev.* July, 1851). Dr. Porcher states that his paper contains the results of an examination of about four hundred volumes. Towards the end of the article (p. 476), Dr. Porcher gives us his conclusions in the following words: "In reviewing the testimony afforded by the preceding facts, our opinions, if we are allowed to express them, are decidedly in favor of the prophylactic powers of belladonna. However some may consider the evidence of a negative character, and therefore unworthy of confidence, yet, from its cumulation, from the careful way in which some observers conducted their inquiries, and from the possibility of failures owing to the use of an inferior or badly prepared drug, we cannot but conceive that to discard it as utterly indecisive, would be indulging a spirit of irrational incredulity, leading to the rejection of any amount of merely presumptive proof. But assuredly under circumstances like these, granting that the efficacy of the means is only problematical, none should hesitate to employ measures so simple in their application, and so safe in their consequences. The failure to avail ourselves of the prophylactic influence of belladonna, we cannot now but regard as a violation of those sacred obligations, which force us to leave nothing untried which *may* contribute so largely to the mitigation, or eradication, of one of the severest inflictions of the hand of God."

Dr. Irwin gave it in the following manner. Three grains of the extract were dissolved in an ounce of cinnamon water, and two or three drops of the solution given morning and evening, to a child under one year old, and one drop more for every year above that age.

Hufeland's formula, which is the one I have always employed myself is, according to Rilliet and Barthez, as follows:—

℞.—Extract. Belladonnæ, ...	gr. iii.
Alcohol, ...	ʒj.
Aquæ Distillat., ...	℥ss.

A drop morning and evening for each year of the age of the child.

ARTICLE II.

MEASLES, RUBEOLA, OR MORBILLI.

Definition; Frequency; Forms.—Measles are an epidemic and contagious exantheme, characterized by catarrhal symptoms, continued fever, and an eruption, generally on the fourth day, of a crimson rash, in the form of stigmatized dots, like flea-bites, slightly elevated, which coalesce into irregular circles or crescents. It ends about the seventh day by desquamation.

The *frequency* of the disease is very irregular in different years, because of its epidemic nature. Thus, according to the tables of Dr. Emerson (*Loc. cit.*), the mortality from measles under twenty years of age, in the twenty years from 1807 to 1827, was 654. In seven of these years (1807, 1809, 1813, 1817, 1818, 1821, 1822), not a death is recorded; in five, the deaths varied between one and eight for each; while in the remaining years, they were as follows: 20 in 1812; 38 in 1825; 47 in 1820; 71 in 1808; 98 in 1826; 99 in 1824; 106 in 1819; and 155 in 1823. During the same period, the deaths from scarlet fever were, as has been already stated, only 93, which shows a great preponderance of measles. If, however, we compare these results with those obtained during other periods, we shall find that scarlatina sometimes causes a much heavier mortality than measles. Thus, during the five years from 1844 to 1848, inclusive, the deaths from measles were 311, while those from scarlatina were 1175, in number. To show still more clearly the variable frequency of measles in different years, I may state that in 1844, but 6 deaths from measles are reported; in 1845, 124; in 1846, 6; in 1847, 77; and in 1848, 98.

Measles appear, on the whole, to be a more common disease, and to attack a larger number of persons than scarlet fever, since, during the last fifteen years, I have met with 314 cases of the former to 263 of the latter.

I shall describe two *forms* of the disease; the *regular* or *rubeola vulgaris;* and the *malignant* or *rubeola maligna.* I shall afterwards treat of its *irregularities* and *complications.*

Causes.—A chief cause of the disease is *epidemic* influence. Of this there can be no doubt, as it is proved by the evidence of all observers.

Contagion.—Its infectious nature is universally admitted. This is thought to begin with the primary fever, and to continue up to the period of desquamation. The precise period at which it ceases is not however known. The disease may be carried in fomites. It has been propagated also by inoculation with the blood taken from a patient, and with serum obtained from the vesicles which sometimes accompany the eruption.

The period of incubation is from five or six, to twenty days or even longer. The average period is about a week or ten days. In the inoculated cases the disease appeared about the sixth or seventh day.

MM. Rilliet and Barthez conclude that measles are more frequent, less contagious, and have longer incubative and prodromic stages than scarlet fever.

The same authors are of opinion that variola is somewhat more rare, rather more contagious, and that its period of incubation and its prodromic stage are a little shorter than those of measles.

Measles, like other contagious diseases, rarely occur a second time in the same individual.

Age.—I find by uniting Dr. Emerson's tables with some given by Dr. Condie (*Dis. of Child.* note, p. 100), that the disease appears to be most frequent between the age of 1 and 2 years, for while 395 deaths occurred in the second year, only 468 occurred between 2 and 5 years of age. This does not agree, however, with my own experience, since of 280 cases of the disease that have come under my own observation, in which the age was accurately recorded, only 36 occurred in the second year, while 84 occurred between the end of the second and the end of the fifth year. This discrepancy depends probably, in part at least, on the greater mortality of the disease during the earliest years of life, which would of course give a larger number of deaths for those attacked in the second, than for those in the third, fourth, and fifth years. The cases that have come under my own observation occurred as follows. They are stated in their order of frequency. In the 6th year, 37; in the 2d, 36; in the 7th, 35; in the 5th, 34; in the 4th, 30; in the 8th, 27; in the 1st, 19; in the 9th, 11; and then in the eleventh, tenth, thirteenth, twelfth, and fifteenth.

Sex.—It appears to be more common in the male than in the female sex. Of 290 cases that I have seen, in which the sex was noted, 156 occurred in males, and 134 in females.

SYMPTOMS; COURSE; DURATION.—*Regular form of the disease.*—*Stage of invasion.*—Measles begin with languor, irritability, sometimes chilliness, anorexia, aching in the back and limbs, fever, thirst, headache, and various signs of irritation of the mucous membrane of the eyes, nose, fauces, and larynx.

The chilliness or horripilations which are mentioned by almost all writers, are difficult to appreciate in children. I have seldom known the child itself to complain of them, but upon inquiry of the mother or nurse, have sometimes been told that they had observed some coolness of the hands or feet, or a disposition to keep near the fire, and a desire for additional clothing. These, therefore, are not important symptoms. Neither is the aching in the back and limbs, as it is seldom complained of, and can be ascertained in the older only by close questioning, or suspected in the younger by their complaining when they are moved. Fever is very rarely absent. It almost always comes on with, or very soon after the other prodromes, but in rare cases does not begin until the second day. It is almost invariably continued, after it once begins, except that it remits somewhat about daylight and in the early part of the morning, to become exacerbated again in the after part of the day. Its intensity increases, and the remissions become less distinct and shorter, as the time for the appearance of the eruption approaches. The pulse is increased in frequency, force, and volume, but rarely attains the same rapidity as in scarlet fever. At the same time the skin becomes warm and dry, the face is generally flushed, and there is considerable restlessness and irritability at first, often passing into quiet and drowsiness as the eruptive point approaches. The fever is accompanied by thirst, partial or complete anorexia, and generally by headache, which is frontal, and often complained of by children old enough to give an account of their sensations.

Vomiting occurs sometimes, but not as a general rule. The catarrhal symptoms commence with, or may even precede the fever. They constitute the most characteristic symptoms of the disease, and indeed the only ones by which we are able to distinguish it with any certainty in the first stage. They are irritation and redness of the conjunctiva, especially that of the eyelids, lachrymation, suffusion of the eyes, sensibility to light, stuffing of the nose, coryza, sneezing, slight soreness of the throat, cough, some constriction of the thorax, and slight dyspnœa. The state of the eyes and nose are very important as signs of the disease. The above symptoms are not always present in the same degree, being very strongly marked in some instances, in others less so, and in some rare cases, absent. They are important, because there are few cases of ordinary cold in which they are present to the same extent, or if so, the accompanying general symptoms are slight compared with those of measles. I have rarely known the faucial affection severe enough to elicit complaints, and never to produce difficulty of deglutition. It consists generally only of slight redness of the tonsils, soft palate, and pharynx, which is most strongly marked about the time that the eruption makes its appearance. The cough usually appears on the first day. Infrequent and slight at first, it becomes more troublesome as the case progresses, until it assumes on the third or fourth day a character which is peculiar, and which may often lead to a suspicion as to the true nature of the attack. It is laryngeal, hard, dry, rather hoarse, and occurs generally in short paroxysms. At the same time the voice is often hoarse.

The tongue is usually white and somewhat furred; the bowels remain in their natural condition, or there may be slight constipation or diarrhœa. Constipation is most frequent, according to my own experience. The drowsiness, to which we have already alluded, often exists during the first stage. I have noticed it in a great many cases. The child, if undisturbed, sleeps quietly for many hours, or for the greater part of one or two days, waking only from time to time to ask for drink, and then sinking off to sleep again.

The symptom is not alarming, unless it be connected with others which indicate local disease, or unless it pass into coma, or alternate with marked delirium. Other nervous symptoms which sometimes occur, especially when the fever is violent, are restlessness, irritability, occasionally delirium at night, and in very rare cases, convulsions. Of 167 cases observed by Rilliet and Barthez, the latter symptom appeared in the first stage only in one, and was then confined to the eyeballs. I have met with convulsions in 5 out of 314 cases at the beginning of the eruption, and in one, of which I shall not now speak, at the close of the eruption. In one of the cases the convulsions occurred on the first day, in a boy five years of age, of nervous temperament, and who had had several convulsive attacks during the process of dentition. The convulsions were general, but slight; they lasted only a short time, and were not followed by any bad consequences. In the second case the sickness began with fever, drowsiness, tremulous movements of the hands, delirium, and in a few hours a slight general convulsion. On the second day there were two attacks of convulsions, both, however, slight. The other symptoms continued as before. On the third day the child was better, the fever having diminished, and the nervous symptoms in great measure disappeared. On the fourth, fifth, and sixth days, the fever returned, and on the middle of the sixth day, a full measles rash made its appearance. There was no recurrence of the nervous symptoms, and the case ended favorably. The third case occurred in a boy between seven and eight years old, of nervous and impressible temperament. The convulsive seizure took place just as the rash was coming out; it was very slight, and lasted not more than one or two minutes. In the fourth case, in a boy in the second year of life, who had already had three convulsive attacks from other causes, showing thereby a manifest predisposition to that kind of disorder, the convulsions occurred as in the previous case, just at the coming out of the eruption. In this case also, the convulsions were slight, lasting only a few minutes. In neither of these two cases were the convulsions followed by dangerous symptoms. In the fifth and last case, the convulsions, as in the two preceding examples, occurred just as the rash was appearing; they were very slight, and were followed by no serious consequences. The subject of this case was a girl between seven and eight years old, who had previously had an attack of convulsions produced by a severe febrile reaction occasioned by simple angina, and another attack, caused by indigestion.

MM. Guersant and Blache (*Dict. de Méd.* t. 27, p. 658) mention another initial symptom, which has sometimes enabled them to recognize the approach of measles before the eruption. This is a peculiar redness, a rose-colored punctuation, of the roof of the mouth, soft palate, and uvula, differing from that of scarlatina. I have observed this symptom myself in a few cases, but, as I have also seen it occasionally in roseola, doubt whether it is much to be relied upon.

The *duration* of the initial stage is generally from three to four days. In a large majority of the cases that I have seen, the eruption has begun to appear in the course of the fourth day. This stage may, however, last only one or two days, or be prolonged to five, six, or seven, and, according to Guersant and Blache (*Loc. cit.* p. 659), it lasted in one case, with all the characteristic symptoms, fifteen days. In a case that occurred to myself, the subject of which was a girl between one and two years old, the eruption, owing no doubt to the presence of severe general bronchitis, did not make its appearance until the ninth day of the sickness, and even then came out slowly and with much difficulty. The disease was known to be approaching from the fact that another child in the house had just recovered from an attack. In another case, in a girl between twelve and thirteen years of age, the eruption began on the fourth day of the sickness, but was so faint and indistinct that I could not, until the sixth day, feel sure that it was a measles rash. Even after this the eruption continued pale and insufficient until the seventh day of the eruption, when it was out fully and completely.

Second stage, or that of eruption.—The eruption generally appears some time in the course of the fourth day, showing itself first on the chin or cheeks, or some other part of the face, and extending gradually to the neck and trunk, and finally to the extremities. It is often completed in from twenty-four to forty-eight hours. It begins in the form of distinct spots, not unlike flea-bites, of a more or less bright rose or crimson color, verging sometimes towards a deep red, of a roundish shape, with irregular edges, and of different sizes, varying between half a line and three lines in diameter. When fully formed they constitute true papulæ, which are felt to be slightly elevated and firm to the touch, with broad, flat summits. When pressed upon, their color disappears, to return rapidly when the pressure is removed. Distinct and scanty at first, the spots or stigmata soon become more numerous, and arrange themselves into clusters of an irregularly crescentic or semilunar shape. The number of these clusters and the consequent general tint of the skin depend upon the amount and intensity of the eruption. In very mild cases, or when the eruption is imperfect, the clusters of papulæ are few in number, and they are separated by large portions of healthy skin. In severe cases on the contrary, the patches are so numerous, and coalesce so closely, that the skin assumes a general deep red tint. Yet it ought to be remarked, that it can be observed on close examination that the papulæ never run completely into each other, so as to form a continuous red surface, unless it be over very small spaces, and on certain parts of the surface, more particularly the face.

The fever does not diminish when the eruption makes its appearance, and it sometimes augments. The skin retains its heat; the irritation of the eyes continues and is sometimes very severe; the nostrils are dry and incrusted, or there is coryza, and in some few cases epistaxis. The face is at the same time flushed, independently of the eruption, the red color of the skin being observable in the intervals between the papulæ, and it looks swelled and turgid, from tumefaction of the cheeks and particularly of the eyelids. The cough continues, and is loud, hoarse, and frequent in most cases, but in others short, scarcely hoarse, and but slightly marked. The voice is usually but not always a little hoarse. The respiration is slightly quickened in regular cases, but generally very little beyond the natural rate. The tongue is covered with a yellowish or whitish fur in its middle, while the edges and tip are clean and red. It remains moist and soft, unless some complication occurs. The tonsils, soft palate, and pharynx, present considerable redness, without tumefaction. The abdomen commonly remains natural, though in some few cases there is slight soreness over its whole extent or in the iliac fossæ. Slight diarrhœa often occurs at this time. It seldom lasts more than from one to three days. In other cases the stools are natural, or there may be moderate constipation. The anorexia and thirst continue up to the stage of decline. About the time of the appearance of the rash, there is often considerable restlessness, anxiety, starting and twitching in sleep, slight delirium, and in children old enough to describe their sensations, complaints of headache. The strength of the patient is not decidedly affected in most of the cases.

Stage of decline and desquamation.—The disease having reached its height in the course of the sixth day, the second of the eruption, it remains nearly stationary for one or two days longer, and begins to subside about the seventh or eighth of the disease, or third or fourth of the eruption. The eruption fades first on the face and neck, and has often very much or wholly subsided on those parts while it is still vivid on the extremities. The papulæ lose some of their color, become less prominent, diminish in size, and when pressed upon do not disappear entirely as they did at first, but leave a dull or yellowish stain behind. A little later, they assume a dirty yellow or copperish tint, which does not disappear under pressure, showing that a slight ecchymosis has taken place into the substance of the derm. These stains continue a variable length of time, and are finally removed by absorption. As the eruption disappears, a slight furfuraceous desquamation takes place in a considerable number of the cases, but not by any means in all. This begins usually about the face, and may either be limited to that part, or extend to other portions of the body. It is seldom general, however, and is often scarcely noticeable. It occurs between the eighth and eleventh days of the disease, or fourth and seventh of the rash.

From the moment the eruption passes its highest point of intensity and begins to decline, the other symptoms do the same. The pulse fast loses in frequency, and regains its ordinary characters. The heat of skin passes away, often with considerable perspiration, but sometimes with gentle moisture only. The various catarrhal symptoms subside; the cough is less frequent, loses its hoarseness, becomes softer, and gradually ceases. The tongue cleans off; appetite returns; thirst ceases; the restlessness and irritability disappear; and the child returns to its ordinary condition of health.

IRREGULARITIES OF THE DISEASE.—Under this term I shall attempt to describe only the anomalous symptoms of the disease, which occur independently of complications. Those which are produced by the latter causes will be fully treated of when I come to consider the subject of the complications.

In some cases, the symptoms of the prodromic stage are so slight that they pass almost unobserved, and the child is scarcely thought to be sick until the rash makes its appearance. In others, owing to some peculiarity of the temperament, or to the state of the constitution at the time, they are much more severe than usual, or some one symptom may be in excess. In one case that came under my own observation, in a girl seven years old, the nausea and vomiting were very distressing, and were accompanied by the most intense frontal headache. She complained precisely as children generally do with tubercular meningitis, and was, moreover, extremely restless, and at night delirious. Nevertheless, the eruption came out on the fourth day, and was perfectly regular in its characters and course; the unpleasant symptoms ceased from that moment, and the patient recovered without any further bad symptoms. I have already spoken of five cases accompanied by general convulsions at the commencement of the first stage. The course of the disease in the subsequent stages, was regular in all respects. In two other cases, in girls, sisters, seven and nine years old respectively, of highly nervous temperament, the headache in the first stage was so intense as to require the application of leeches for its relief; yet the disease was regular in its other characters.

The eruption presents various irregularities which ought to be noticed. It has already been stated that the amount of the rash varies according to the severity of the case, although in other respects regular. Sometimes the papulæ are comparatively small in size and few in number, and consequently, the clusters in which they are arranged have considerable spaces of healthy skin between. When this is the case, the stigmata are usually rough, lighter in color, and from this circumstance and the fact that the spaces between the clusters are large, the general tint of the skin is much less deep than in severer cases, in which the opposite of these characters prevails. In some of the mildest cases, the amount of eruption upon the extremities has been very small, and after forming, it has very rapidly, in the space of a night, faded to such a degree as to seem almost a retrocession. But as this sudden disappearance has not been accompanied or followed by dangerous symptoms, it is clear that it was dependent simply on the mildness of the attack.

In such instances the general symptoms have always been slight, and the whole duration of the sickness shorter by two or three days than in severer cases.

I have already described the dull yellowish stains which remain after the papulæ have faded. These stains sometimes assume, in malignant cases, a livid or purplish hue, from the occurrence of passive hemorrhage into the tissue of the derma. They may, however, assume a dark and purpureous appearance, without any malignant or dangerous symptoms whatever. This happened in a family in which I attended seven cases of the disease in 1845. In three of them (boys of 10, 5, and 1 year old, respectively), the eruption, which was copious and regular in all, became in a single night, at the moment of decline, of a dark brown or light purple hue. The spots did not disappear at all under pressure, and were evidently formed by true ecchymoses. The general symptoms were all favorable. The only peculiarity to be observed was that the fever had disappeared very suddenly, and that the extremities were slightly cooler than natural. The convalescence was as usual, except that the ecchymotic spots disappeared very slowly and gradually. I have, since the above-named period, seen a great many similar cases, but in none have the symptoms been attended or followed by any evil consequences.

Several authors describe a form of measles without eruption. They state that during the epidemic prevalence of the disease, some children present all the catarrhal and febrile symptoms, without the eruption, and that they are protected against future attacks. The last assertion, at least, must be very difficult to prove. For my own part, I have never met with such cases, and should I ever seem to do so, would certainly not call them measles, lest by so doing the parents might be induced, on future occasions, to expose the child unnecessarily to the disease, when, should any evil consequences follow, they might justly question the wisdom of the physician's advice.

Willan and other authors have described another variety of the disease, to which is applied the term rubeola sine catarrho, or measles without catarrhal symptoms. Such cases are said to present no catarrhal symptoms whatever, and little or no febrile reaction. They are stated, moreover, to occur generally during the epidemic prevalence of measles. Most authors agree that this form does not protect the constitution against the true disease, and some regard it only as an eruption resembling measles, dependent upon gastric disorder. My own opinion is that such cases, of which I have seen a considerable number, are nothing more than examples of roseola. The entire absence of catarrhal pneumonia and of fever, or their very slight character, the short duration of the cases, and the little constitutional disturbance exhibited by the patient, all serve to convince me that they cannot be attacks of true measles. I recollect three such cases in particular, which, had they been accompanied by cough and fever, I should certainly have called measles. They all occurred in infants. The rash was preceded for two or three days by feverishness, uneasiness, restlessness during sleep, and slight diarrhœa, after which the eruption suddenly made its appearance and covered the whole integument within twenty-four hours. There were no catarrhal symptoms whatever. At the same time the febrile symptoms disappeared and the children seemed quite well. The eruption never lasted over forty-eight hours, and disappeared without leaving a trace behind. They were, no doubt, cases of roseola.

Rubeola Maligna.—This form may occur either as an epidemic or sporadic affection. Generally, however, it prevails as an epidemic, and depends upon some peculiarity which it is impossible to understand. The few sporadic cases which are met with, may be traced generally to some vicious state of the constitution of the individual, or to the unfavorable hygienic conditions in which he is placed. The symptoms assume ataxic or adynamic characters, which give to the case the features of the typhous or typhoid type of disease. They may make their appearance in the prodromic, or, as happens more frequently, not before the eruptive stage. When they begin in the first stage, the case is marked by great frequency and feebleness of the pulse; by prostration; by unusual dyspnœa and oppression; and especially by greater violence of the nervous symptoms, as delirium or stupor. Sometimes, even in this stage, petechiæ make their appearance, and there is lividity and soreness of the fauces, with discharges of dark blood from the nostrils, and sometimes profuse and exhausting diarrhœa or dysenteric discharges. When the time for the eruption to appear arrives, this comes out slowly and imperfectly, or irregularly, and generally assumes a livid, purplish, or blackish color, owing to the passive exudation of blood into the papules, and hence the name sometimes given to such cases, of *Rubeola Nigra*, or *black measles*. This form of the disease assumes, in fact, many of the features of purpura hemorrhagica. The patient may die of exhaustion, of congestion of some important organ, as the brain or lungs, of the diarrhœa or dysentery which sometimes complicates the disease, or finally of the hemorrhages which occur in consequence of the dissolved and fluid state of the blood; or he may, after a severe struggle with the disease, recover his health.

Complications and Sequelæ.—MM. Rilliet and Barthez begin their chapter on the complications of the disease with the following excellent remarks. "Rubeola manifests itself by an inflammation or inflammatory fluxion upon the skin and mucous membranes. The regular course of the disease depends upon the conservation of a due equilibrium between these two kinds of fluxions. That which is seated in the skin ought in general to predominate: if the equilibrium be destroyed by any cause whatever, whether accidental or inherent to the disease, and should the predominance of the inflammation take place in the mucous membranes, there will result a phlegmasia of some one of those tissues.

"It is easy to foresee, by attention to these circumstances, that the inflammatory complications of measles will be most apt to fall upon the mucous membranes, and that broncho-pneumonia, pharyngo-laryngitis, and intestinal inflammations will be the most frequent of all."

Bronchitis and Pneumonia.—These constitute by far the most frequent and important complications of measles. In 167 cases, MM. Rilliet and Barthez met with 24 cases of bronchitis, 7 of pneumonia without bronchitis, and 58 of lobular broncho-pneumonia. This statement shows how very large a proportion of the cases of measles occurring in the Children's Hospital at Paris, became complicated in the course of the attack. The proportion in private practice is much smaller, since in 314 cases I have met with only 24 of bronchitis, and 6 of lobar pneumonia. These are, however, in private practice, according to my experience, much the most important of the complications likely to occur. Of six deaths which occurred in the 314 cases that I have seen, 3 were caused by bronchitis.

The time at which these different complications make their appearance is important. They may occur during the initial stage, early in the eruptive stage, during the decline of the eruption, or after the eruption. The most common period for their occurrence is the initial stage. It is difficult or impossible to ascertain their causes in a great many cases. In some instances they depend evidently upon cold. Age has some influence upon their production, as bronchitis is most apt to occur in young children, whilst lobar pneumonia attacks those who are older.

The *physical signs* of these affections are the same as when they exist in the idiopathic form. The rational signs are increase of cough, which, instead of being merely laryngeal, becomes deeper and either pneumonic or catarrhal, and dyspnœa, which is sometimes excessive, the number of respirations mounting to 40, 50, and, in severe cases, to 60 and 80. The pulse is more frequent than in regular measles, and in very bad cases becomes rapid and small; the skin is hot and dry; the face is pale and anxious in severe cases, in which the eruption does not appear; and the child is generally restless and irritable, with broken irregular sleep, or in the most violent cases, it is dull and soporose. In two of the fatal cases that came under my observation, convulsions occurred. It should be remarked, however, that in one, the patient, a boy only nine months old, was laboring under an attack of hooping-cough, and that it was in one of the paroxysms of that malady that death took place. In the other case, that of a boy eighteen months old, the convulsions occurred first on the day of eruption, and then ceased, to recur again the third day afterwards. The bronchitis dated from before the appearance of the eruption, and was no doubt the cause of the convulsions and death.

When a pulmonary complication begins in the prodromic stage, it almost always modifies the eruption in some manner, either retarding or rendering it irregular or imperfect. When it dates from the second stage, it may cause a partial or complete retrocession of the eruption. I have known the eruption to be retarded several days, so as not to come out until the fifth, sixth, or even ninth. When the rash does appear, whether at the usual period or later, it is evidently with difficulty. It is pale and scanty, or abundant on one part of the body, and scanty on another, or it appears and disappears alternately. At length it either comes out fully, and the threatening symptoms pass away, or the eruption lasts the usual, or nearly the usual length of time, in its pale and imperfect condition, and the child recovers slowly and gradually from the complication, which has become the most important part of the sickness; or, in fatal cases, the symptoms grow worse and worse, and the child dies after a few days, or a longer time, according as the inflammation assumes the acute or chronic type.

Whenever it is observed in a case of measles, that there is more drowsiness or irritability than usual, or that the pulse is more frequent or stronger than it ought to be, it become important to ascertain carefully the state of the respiration. If this be accelerated, the thorax ought to be examined with strict attention by auscultation and percussion, to discover whether there be not some pulmonic inflammation at work, likely to convert the disorder from a mild one, as it almost always is when uncomplicated, into one dangerous to life, which it will assuredly become, should any pulmonic complication be allowed to steal unawares upon the patient.

The prognosis of the pulmonic complications of measles would appear to be very unfavorable in hospitals for children, since Rilliet and Barthez state that scarcely one patient in four or five recovered. Of the 30 cases that I have seen, I have already stated that 3 died of bronchitis, and if we recollect that one of these was complicated also with pertussis and morbid dentition, it will be seen that the prognosis is, as might be expected, vastly more favorable in private than in hospital practice.

Laryngitis is a common complication of the disease. The authors just quoted, met with it in 35 of their 167 cases. It occurred in 8 of the 314 cases that came under my observation. It is often accompanied by pharyngitis.

Autopsies show that the laryngitis may be slight, severe, or accompanied with pseudo-membranous exudation. The inflammation may be simple, consisting merely of different degrees of redness, or of redness with thickening and softening of the mucous membrane; it may be more intense and accompanied by ulcerations or erosions; or, lastly, it may be associated with an exudation of false membrane.

The symptoms of this complication will depend upon the form the inflammation assumes. It is unnecessary to describe them here, as they are the same as those of the idiopathic affection, which has already been fully treated of.

The occurrence of laryngitis exerts but little influence on the rash, particularly as it almost always appears during the decline of the latter. It is seldom fatal, unless it assume the pseudo-membranous form. The eight cases that came under my observation were attacks of the simple disease, and they all recovered.

Inflammation of the intestines.—According to Rilliet and Barthez, lesions of the intestinal mucous membrane are the most frequent complications after pulmonary affections. About a third of the cases presented at the autopsy erythematous inflammation of the mucous membrane; a fifth offered follicular entero-colitis, a seventh ulcerative inflammation, and a fourth softening. Some presented several of the lesions united, and in a few no lesion was found, though the symptoms of entero-colitis had existed during life. I give these data from the above authors, not because they apply to private practice, but merely in order to show what are the tendencies of the disease, when disposed from unfavorable hygienic conditions to take on complications. I have met with only seven instances of intestinal inflammation in the 314 cases that have come under my own observation. Four of these occurred in the same family, in children of seven, five, three, and one year old respectively. They were cases of entero-colitis, accompanied in two, with dysenteric symptoms, and all made their appearance towards the close of the disease. The three remaining cases were attacks of dysentery, one of which was very severe, the stools amounting to twenty in the day, while the other two were much less so.

The intestinal complications may appear during the initial stage, or on the day of eruption, but if not at one of those periods, they are most apt to occur during the decline of the rash. The slight cases, constituting the common diarrhœa of the disease, generally begin early, whilst the grave cases usually date from a later period of the disease. The *causes* of these complications seem to be various exciting agents acting upon a mucous membrane predisposed, by the nature of the disease, to inflammatory action. These agents are said to be generally improper food, giving rise to indigestions; and the too early use of purgative remedies, and laxatives. In the cases observed by myself, it was impossible to detect the causes.

The *symptoms* are more or less abundant diarrhœa, and in some, but not all the cases, sensibility with tumidity and tension of the abdomen. This complication does not exert much influence upon the measles, which usually pursue their regular course. Sometimes, however, it occasions an aggravation of the febrile symptoms, and when of a grave character, may no doubt interfere with the regular progress of the eruptive disease.

According to Rilliet and Barthez, this complication was very seldom the only, or even chief cause of a fatal termination. Scarcely five or six of all that they observed, could be considered as of that kind. It increases very much, however, the danger of the pulmonic attacks, for the latter are much less serious, so long as they exist alone, while as soon as intestinal inflammation is added to them, they become almost necessarily fatal. The seven cases that I met with recovered under simple treatment.

In a considerable number of cases, a slight diarrhœa, to which I have already referred as a common event in measles, occurred, but only in the seven above-mentioned did it amount to a serious complication.

In one case that came under my observation, in a girl between five and six years old, fatal *congestion of the brain* occurred just as the rash was disappearing. There was no evident cause whatever for this accident. There had been no imprudence either as to diet or exposure. The child was, however, of a tubercular family, the mother having at this very time, tubercular disease of the lungs. The eruption had come out well and properly, and continued to do so on the second day without any irregular, or threatening symptom. On the third day of the eruption, this began to decline, and the child had an attack of spontaneous vomiting, but continued through the day cheerful and pleasant. The night of that day was restless and feverish, and she wanted much drink. On the fourth day she was drowsy and heavy, and complained of her head. I saw her first in the evening of this day. She was then very dull and heavy, scarcely answering questions, and protruding the tongue slowly, and after much urging. She had some little, but not a troublesome cough. Careful examination revealed no disease of the thoracic organs. The respiration was natural, and the pulse full and very frequent. On the morning of the fifth day, the patient was comatose, neither answering questions, nor protruding her tongue. In the course of the day, there were some irregular convulsive movements. In the evening the right arm was rigidly flexed at the elbow, and the left one stiffly extended. The patient died that night.

In another case death occurred from sudden *effusion of serum* into the internal cavities, caused apparently by the existence of an excessively hydræmical state of the blood, which had been allowed to come on gradually, without any attempt on the part of the parents to seek a remedy during the slow approach of this condition of the circulating fluid. The case occurred in a boy in the second year of his age, and who had a phthisical mother. The attack of measles took place in the last week of January, 1852, and was regular, and not, according to the account of the parents, I not having seen the child, at all severe or dangerous in any respect. After the attack was over, however, and though he was running about the house as before, he continued to look more and more pale and sickly until the evening of February 25th, when, suddenly, after 11 P. M., he was seized with fever, and became very restless. On the following day, at 9 A. M., I saw him. He was then extremely pallid, and very drowsy and heavy; the breathing was rapid and oppressed, the pulse very frequent, and the skin hot and dry. He was evidently dropsical, as both the face and hands, and the feet also, were puffed, smooth, and doughy. The bowels had not been opened the previous night. In the evening the pulse was 170; the skin was still hot, and the breathing very rapid and much oppressed. There was scarcely any cough. The percussion was dull over too large a space in the præcordial region; the cardiac impulse was obscure, and the sounds indistinct and muffled; there was no bellows-murmur. The percussion was dull over the inferior dorsal regions. No râle whatever was heard. The child died on the following morning at 8½ o'clock. Ten minutes before his death, he asked for a drink, lifted himself up in bed, drank freely, looked around intelligently, and then laid down and died. At the autopsy, the subcutaneous cellular tissue was found to be infiltrated with serum. On puncturing the right pleural sac, there was an immediate escape of a clear, straw-yellow serum. There was considerable effusion in the left pleura also, but less than in the right. The pericardium contained at least two ounces of serum, so that it was pushed off to a considerable extent from the heart. There was a slight pleuritic adhesion of the upper lobe of the right lung to the ribs. This was, however, evidently of an ancient date. There was no other inflammation of the pleuræ, and none of the pericardium. Both lungs contained tubercles, which were not very numerous, but in the upper lobes of considerable size. There was no pneumonia, but both lungs were somewhat congested. The heart was larger than usual. In the right auricle there was a rather large, and white, but soft concretion, and a smaller one in the right ventricle. The left cavities presented no concretions. The valves were healthy.

There are several other disorders which sometimes complicate or follow measles, but as I have already given as much space to this subject as the limits of the work will allow, I shall be satisfied with a simple enumeration of them. They are otitis, ophthalmia, hemorrhages, stomatitis, anasarca, and different cerebral symptoms. I will merely add, that measles are supposed by many observers to have a special tendency to develop tubercular disease in the system, and that it is necessary, therefore, to treat a child, showing any predisposition to that diathesis, or one born of tubercular parents, with particular caution, both at the time of the disease, and during the convalescence. It is not uncommon for measles to be conjoined with other eruptive diseases. I have known it to coexist with scarlatina in two instances, and Dr. G. B. Wood has met with a fatal case of the same nature. It may be associated, likewise, with variola, or with erysipelas; of the latter I have met with one instance. I will mention here that of the whole 314 cases of measles that I have observed, 257 were simple, and 57 complicated. The complications were as follows: bronchitis, 24; pneumonia, 6; laryngitis, slight or severe, 8; dysentery, 7; pertussis, 7; scarlatina, 2; convulsions in the early stage of the disease, 5, and in the latter stage, 3; keratitis, 2; intermittent fever, 1; erysipelas, 1; meningitis, 1; congestion of the brain, 1; serous effusion into the internal cavities, 1. It ought to be observed, however, that in the above enumeration, several cases are referred to twice, and one, a case in which pertussis, bronchitis, and convulsions occurred, three times.

Anatomical Lesions.—It is difficult to ascertain what are the characteristic lesions of measles, because of the fact that most of the fatal cases prove so in consequence of some complication. Some few fatal cases, however, of the regular form, and some in which the complication was so slight as not to be likely to change the autopsical appearances much, have led to the following conclusions.

The lesions peculiar to measles are the following: general congestion of different organs, which are colored red from the imbibition of blood and sometimes softened. The congestion affects the mucous membranes particularly, and imparts to them a reddish or slightly blackish color. In some of the cases there is morbid development of the intestinal follicles. The most important lesion, however, is that of the blood, which presents the appearances common to the class pyrexiæ. These are normal proportion, or diminution, of the fibrinous, with increase of the globular element of the blood. Dr. Copland (*Dict. Pract. Med.* vol. ii, p. 819) gives the appearances in a few fatal cases of malignant measles. They were, softening of the tissues and the facility with which they were torn; the presence, in some of the cases, of a turbid or sanguineous serous fluid in the serous cavities; general congestion of the lungs; dark appearance, and livid or purple ecchymoses of the bronchial mucous surface, of the fauces, stomach, and cæcum; engorgement with dark and semi-fluid blood of the veins and sinuses of the brain, and of the auricles and large veins; and finally a livid and mottled appearance of some parts of the body, with petechiæ of a dark color.

Diagnosis.—It is impossible to diagnosticate measles in the first stage with any considerable certainty. The existence of the disease may be suspected in that period from the appearance of the eyes, from the coryza and sneezing, the frequent, hoarse, scraping cough, and the fever, headache, and thirst. If, in connection with these symptoms, it happens that an epidemic of measles be prevailing at the time, or that the child has been exposed to the contagion of the disease, the inference becomes still more plausible. Nevertheless, any opinion upon this point ought to be given with much reservation.

After the eruption has come out fully it is not likely to be mistaken for any other disease, unless it be roseola, the rash of which sometimes resembles that of measles very closely. It may be distinguished, however, by attention to the concomitant symptoms,—by the slight degree of fever, the more rapid evolution of the rash, and the absence of the peculiar catarrhal symptoms in roseola. In the very early stage of the eruption, measles may be confounded with variola. A careful attention, however, to the size and shape of the papulæ, which are much larger, flatter, and less elevated in measles, and the presence of the catarrhal symptoms, will usually suffice to distinguish them, even in the earliest stage. A little later, the appearance of vesicles on some of the papulæ about the face in variola, will show the difference still more strongly. The distinction between measles and scarlatina has already been drawn in the description of the latter disease. It rests chiefly on the much shorter duration of the prodromic stage, the greater violence of the anginose symptoms, the absence of the peculiar catarrhal symptoms, and the more rapid evolution of the eruption in scarlet fever; and lastly, on the differences in the two eruptions, observable especially at their first appearance.

When measles are conjoined with some other eruption, the diagnosis is to be made out by a careful study of the initial symptoms, and of the eruption on different parts of the body, for we can generally find well-marked patches of the rash peculiar to each on some portions of the surface. In one of the cases of measles and scarlatina that I saw, the latter disease was developed first. The eruption made its appearance in the usual form; on the second day of the eruption, the child was seized with hard, hoarse, laryngeal cough, and with redness of the eyes and lachrymation. These symptoms continued three days, at the end of which time the scarlatinous rash had disappeared from the face, but remained visible upon the trunk and extremities. Characteristic measly papulæ now made their appearance on the face, and pursued their regular course, while on the trunk and extremities, the measly eruption was never well defined, being mixed with and disguised, as it were, by that of the scarlatina. In the other case, the measles appeared first and went on regularly until the eruption was declining and the general symptoms moderating, when suddenly the fever, heat of skin, restlessness, and irritability returned, and the child was very soon covered with the punctuated scarlet rash of scarlatina.

PROGNOSIS.—The prognosis of simple, uncomplicated measles is very favorable; the cases almost always recover without difficulty. This is shown to be true by the following facts. Rilliet and Barthez report 36 cases of simple measles, of which all but one recovered. Of 257 cases that I have seen, all terminated favorably. When, on the contrary, complications occur, the disease always becomes more or less dangerous, the degree of danger depending on the nature of the intercurrent affection, and on the hygienic conditions in which the patient is placed. Thus, of 131 cases observed by the above authors, in which some form of complication occurred, 89 or about two-thirds proved fatal, while of the 53 complicated cases that I have seen, only 6 were fatal. It must be recollected that the cases of the French observers all occurred under the unfavorable hygienic conditions of a large hospital, in children of bad constitution from congenital or acquired causes, whilst mine were observed in private practice, where the hygienic conditions are favorable in the same degree as they are unfavorable in hospitals.

The six fatal cases that came under my observation, proved so from the circumstances I am about to mention. The first occurred in a child nine months old, who was laboring under pertussis when attacked with measles. Bronchitis supervened upon the measles, and proved fatal by convulsions, which came on during a paroxysm of hooping-cough, two weeks after the disappearance of the rubeola. The second case was that of a boy, eighteen months old, who was prescribed for by an apothecary from behind his counter, until I saw him. The eruption made its appearance imperfectly, I was told, and with a convulsion. After this, he was very restless, and had rapid and difficult respiration and much cough. On the morning of the fourth day of the eruption, this had almost entirely disappeared, and the child was again attacked with convulsons. I saw him shortly after this for the first time, and found him comatose, with convulsive movements of the limbs, extreme dyspnœa, and all the symptoms of extensive bronchitis of both lungs. He died thirty-six hours from this, as was to be expected. The third was a case of pneumonia in a child between one and two years of age, in which the inflammation came on as the eruption was fading, and proved fatal in spite of all that conld be done, on the eleventh day. The fourth occurred in a boy between four and five years old, who appeared to recover perfectly from the measles, but was attacked in ten days with meningitis, and died. The fifth was the case of congestion of the brain already detailed in the remarks upon complications, as proving fatal shortly after the decline of the rash. The sixth was that of sudden dropsical effusion into the internal cavities, also described in the remarks upon complications.

To conclude, we may state that the prognosis is always highly favorable under the following circumstances: when the disease is primary; when the initial stage is of the proper duration; when the eruption begins upon the face and extends gradually to the rest of the body; when the febrile movement is moderate; when the eruption, after increasing for one, two, or three days, gradually decreases; when the cough and other concomitant symptoms diminish with the fever; when the cutaneous surface, after the fading of the rash, assumes a natural color, and is neither flushed nor pale; when the appetite returns, the disposition to be amused and take notice continues, and lastly when the sleep is natural.

On the contrary, the prognosis becomes unfavorable under the following circumstances: when the initial stage lasts longer than usual, and when it is accompanied by violent symptoms of any kind, as extreme jactitation, irritability, dyspnœa, much stupor, coma, or convulsions; when the eruption is irregular in its appearance or course; when the fever does not disappear with the eruption, whether it remains violent or assume the form of hectic; when, after the eruption, the face continues deeply flushed or becomes very pale; when the cough, dyspnœa, or diarrhœa persist; and lastly, when the child remains weak, languid, dispirited, or irritable.

It may be stated in conclusion, that the prognosis of measles is always favorable in proportion to the health of the child at the time of the invasion, and the regularity with which the disease passes through its different phases; while it becomes unfavorable, though far less so in private practice amongst people in easy circumstances, than in hospitals or amongst the poor and wretched, whenever it attacks a child already laboring under some disease, and when it becomes complicated with any other malady, either local or general.

Treatment of the Regular, Simple Form.—This form requires in a large majority of the cases little other treatment than strict attention to the hygienic condition of the patient, the use of simple diaphoretics, of mild cathartics occasionally, and the palliation of any of the symptoms that may chance to become somewhat more troublesome than usual.

Hygienic Treatment.—The child ought to be confined as much as possible to bed in a large, well-ventilated chamber. Every precaution should be observed to prevent chilliness, while at the same time it is nearly, if not quite as important, to avoid over-heating the patient, either by excessive clothing or by keeping the temperature of the room too high. In winter, it is well to direct the temperature to be maintained at between 68° and 70° F., night and day. If this be done, the child is not apt to take cold, even though it be uncovered at times, and yet the warmth is not oppressive. I have often remarked that this temperature is just what it ought to be when the room is well ventilated, either by means of an open fireplace, or by communication with adjoining rooms; but when, on the contrary, the room is heated by a furnace flue, and not ventilated at all or very imperfectly, the same temperature as indicated by the thermometer becomes extremely close and oppressive. Under such circumstances, a door into an adjoining room, or if this cannot be, one into the entry, ought to be kept more or less open, with a screen of some kind between it and the child, in order to secure a good ventilation, which is assuredly of the very highest importance, and yet to prevent by the screen a current of cool air from chilling the patient. The diet during the febrile period ought to be very light. It may consist of milk and water, of arrow-root, sago, or tapioca, prepared with milk or water; or of crackers soaked in water, with salt, or some similar food. When the eruption and fever have in great measure disappeared, some light broth, either vegetable or animal, with dry toast or bread, plain boiled rice, a roasted potato, or ice cream, may be added; and after all the symptoms have ceased, the usual diet can be gradually resumed. The drinks may consist of simple water, of lemonade, orangeade, gum water, or flax-seed tea, with the addition of a little sweet nitre; or of weak infusions of balm, sweet-marjoram, or saffron. They may be given in any reasonable quantity, at the temperature of the room. Some persons have a great dread of cold water in the disease. I have never seen small quantities (half a wineglassful to a wineglassful at a time) of the coldest water do any harm, and believe it to be useful when the fever is violent, and the heat very great. I once, however, saw a boy nine years old, attacked with violent colic and partial retrocession of the eruption, after swallowing suddenly a tumblerful of iced water. The unpleasant symptoms passed off in a few hours, and he had no difficulty afterwards.

The patient should not be permitted to leave the room until a few days after the entire disappearance of the disease. It ought to be kept in the house until it has regained in some measure its strength and healthful looks, as it will scarcely be able to resist exposure before.

THERAPEUTICAL TREATMENT.—The therapeutical management of the regular form ought to be very simple. When the bowels have not been opened naturally for one or two days, it is proper to direct an enema to be used, or, if the fever and restlessness are considerable, some mild laxative, as a teaspoonful or dessert-spoonful of castor oil, a dessert or table-spoonful of syrup of rhubarb, half a teaspoonful of magnesia for older children, or less for younger, or some similar remedy, always selecting those which are mild, and giving them in small doses, lest they irritate the gastro-intestinal mucous membrane. It is better to give a small dose and repeat it in four or six hours, or assist it by an enema, than to give such a quantity as might produce over-purging, and thus perhaps disturb the regular progress of the eruption. The laxative may be repeated from time to time throughout the disease, if the bowels are not moved naturally. After the laxative we may either do nothing, when the case is mild and when it progresses favorably, or else give one of the infusions above mentioned, or a little sweets spirits of nitre. If the reaction, however, be considerable, with much headache, restlessness, and dry, hot skin, I would give small doses of antimonial wine and sweet spirits of nitre (from one to three or four drops of the former, with ten or twenty of the latter), every two hours, and direct a warm mustard foot-bath to be given twice a day. If the fever be violent, with frequent, strong, and full pulse, intense heat of skin, severe headache, and much restlessness, even without any present sign of local disease, it would undoubtedly be correct to resort to moderate depletion, in order to prevent the formation of any local affection, or to relieve any which may be in process of formation, though not as yet indicated by local symptoms. Of the 257 regular cases that I have seen, depletion was employed only in 2: in one a venesection of four ounces in a boy seven years old, in consequence of the great violence of the reaction, and not from any discoverable local affection; and in the other, the application of leeches to the temples, for intense headache, in a girl nine years old. Under the same circumstances a warm bath, given with care, and continued for fifteen or twenty minutes, will be found of great service; or, a simple foot-bath may be used, and repeated three or four times in the course of a day.

If any of the local symptoms become particularly troublesome, they should be palliated by simple treatment. When the cough is very frequent and hard, it is most effectually moderated by some anodyne, which may be given in most cases without any detriment. The only contraindication to its use is the presence of severe headache or some other cerebral symptom. A mild counter-irritant application to the outside of the throat is also useful; I have generally used sweet oil and spirits of hartshorn. When the conjunctival inflammation is acute and painful, it may be relieved by lotions with simple warm water, milk and water, or sassafras-pith mucilage, alone or mixed with rose water. If the headache be very violent it can generally be relieved by the use of a laxative, by the occasional use of a mustard foot-bath, or of a sinapism to the nucha. When very severe and attended with much fever, it is safest to direct an application of leeches to the temples.

The *malignant form* of the disease must be treated chiefly with stimulants and tonics. The most useful are wine and brandy, quinine, ammonia, capsicum, etc. Camphor and opium would be proper, were the case attended with severe nervous symptoms. The diet ought to be nutritious and digestible, and may consist of milk and bread, light broths, and beef tea or essence of beef.

When local inflammations occur, they may be treated by a small venesection if it can be borne, by a few cups or leeches, or by means of counter-irritants, of which the most suitable are mustard, spirits of turpentine, or ammonia. Blisters ought to be avoided, as they are very apt to occasion dangerous and even fatal sloughing.

TREATMENT OF THE COMPLICATIONS.—*Bronchitis, Pneumonia.*—The mode of treatment of these complications must depend upon the stage at which they are developed, and upon the age and constitution of the subject. When they occur during the first stage, one of the most important points in the treatment is to endeavor to favor the appearance of the eruption, and when in the second stage, and the eruption has retroceded wholly or in part, the same indication applies with equal force. When they appear during the third stage, they are to be treated without any regard to the eruption, but always with reference to the fact that the patient has just passed through an acute febrile disease, which must have weakened in some degree the vital powers.

It may be stated in general terms, that the treatment proper for these local inflammations when they occur as primary affections, is proper also, with some reservations, under the circumstances we are now considering.

Thus, bloodletting ought to be resorted to in some of the cases, but always with caution, since it is perfectly true that it cannot be used safely in secondary with the same freedom as in primary phlegmasiæ. In children under two years of age I have generally employed leeches, while in those over that age I have resorted to venesection, and in one case to venesection and leeching both. In all such cases I have used depletion with greater moderation than in primary cases, rarely applying more than a dozen American leeches at once, or taking more than four ounces of blood from the arm. Purgatives may be used in conjunction with the depletion, always, however, bearing in mind in the choice of them, and in the doses, the disposition to gastro-intestinal irritation which is inherent in the malady. The antimonial preparations are also useful, given, however, with greater care than usual. I generally employ antimonial wine with sweet nitre, or a solution of tartar emetic in simple water. Of the latter the thirtieth or fortieth of a grain for very young children, and the twentieth or thirtieth for those who are older, given every half hour or hour, is enough. If the quantity first given produces either sickness or diarrhœa, it should be instantly suspended or very much reduced in strength. For children within the year, the syrup of ipecacuanha, in doses of two to five drops every hour or two, is preferable to antimonials. When in these cases the skin is at all coolish, or bathed with too considerable a perspiration, I have found the liquor ammoniæ acetatis a very useful remedy.

It is universally acknowledged that it is exceedingly important to assist nature in throwing out the rash, whenever these complications either prevent its formation, or cause its retrocession. The true mode of doing this is to cure or alleviate the internal inflammation, which is the cause of the difficulty. To attain this end the above plan of treatment ought to be instituted at once. At the same time, we may greatly assist the appearance of the eruption by a persevering employment of counter-irritants. The best of these is, I believe, mustard, and in some cases a warm bath. The mustard may be used in the form of plasters, poultices, or baths. My own plan in moderately severe cases, is to apply a mustard poultice to the interscapular space, and to make use of a mustard foot-bath, two or three times a day, while in severe and urgent attacks I direct the cataplasm and bath to be renewed every two or three hours, taking care, however, to apply the former alternately to the front and back of the chest, in order to avoid all possibility of too violent an action upon the skin; the feet and limbs also ought to be carefully watched, to avoid the same danger. I have had occasion to observe the great efficacy of this unremitting employment of revulsives, in several severe cases of bronchitis in young children. In some I have depended solely upon this treatment, and the use of small doses of ipecacuanha and spiritus Mindereri. In one particularly, which occurred in a child eight months old, the attack came on in the first stage. On the fourth, fifth, and sixth days, the dyspnœa was excessive, the respiration running up to 70 and 80; the pulse was frequent and small; the skin pale and rather cool; and the irritability and restlessness very great. For a period of twenty-four hours, I used the poultices and foot-baths every two hours regularly, and gave internally the spiritus Mindereri at the same intervals. Nothing else was done. On the sixth day, when one of the poultices was removed from the interscapular space, the integument beneath was observed to be covered with the measly stigmata, whilst there were none as yet on any other part of the surface. From this time the eruption came out freely, and the child recovered rapidly.

The warm bath may be used under the same circumstances. It should be given with great care, the child being wrapped in a warm blanket the moment it is removed from the water, to prevent the least sensation of chilliness. It may either lie for a short time in the blanket, or be wiped dry beneath it, and then dressed.

Cases of pure bronchitis require less depletion that those of pneumonia. In some of the cases of bronchitis, there has been profuse secretion attended with extensive subcrepitant and mucous râles. In such instances I have found the internal use of the syrup or infusion of polygala seneka, with an occasional revulsive, very effectual.

The *diarrhœa* which occurs so frequently seldom requires any treatment. Indeed, unless it indicates evident entero-colitis, or is accompanied by frequent mucous or bloody stools, and by pain and tenesmus, it is better not to interfere with it, beyond paying strict attention to the diet. When attended, however, with the symptoms just mentioned, it must be treated by astringents, by opium and ipecacuanha, and by the application of poultices to the abdomen. The seven cases that occurred to myself recovered under the use of laudanum enemata, given twice or three times a day, the strictest diet, and small doses of Dover's powder.

Laryngitis, as it occurs in most of the cases, needs but little treatment beyond careful avoidance of cold, the use of some mild nauseant, and revulsives to the neck. It is very seldom of a dangerous character. When, however, it assumes the character of pseudo-membranous croup, it must be treated with all activity, in the manner described in the article on that disease. In only two of the eight cases I have seen, did it appear at all threatening. One of these occurred in a boy ten years old, and came on in the first stage. The voice was very hoarse and difficult; the cough was frequent, hoarse, and croupal, and preceded and followed by loud stridulous respiration. Fearing the formation of false membrane, though none was visible in the fauces, I ordered a venesection of four ounces, and doses of hive syrup every two hours, and finding at the end of six hours that there was no improvement, I had between three and four more ounces of blood taken from the throat by leeches. This was followed by slow but steady amendment of the symptoms; the eruption came out well, and no further difficulty occurred. The second serious case occurred in a boy between one and two years old, also in the first stage. The symptoms were like those of the first case. They were treated by an application of leeches to the throat and by an emetic of alum, which relieved them very much, and they disappeared gradually. The eruption pursued its regular course.

The *cerebral symptoms* which sometimes occur, must be treated differently in different periods of the disease. In the early stage, when they last but a short time and do not recur, they require nothing more than a warm bath, and the use of revulsives. If they continue to recur, or are followed by stupor or other cerebral symptoms, more energetic treatment becomes necessary. If the child is strong and hearty, it would be proper to resort to depletion, either by venesection, or by cups or leeches to the back of the neck or temples, and to purgatives, revulsives, and cold applications to the head. When it does not seem proper to bleed, and when the heat is intense, it has been proposed to use cold lotions in the manner recommended in scarlatina. The evidence upon this point is not very conclusive, and as I have never used them, nor seen them used, nor indeed seen any necessity for a resort to them, I can offer no opinion in regard to their use.

I have met with five cases of convulsions in the first stage. One occurred in a boy five years old; the convulsions were slight, lasted not more than ten or fifteen minutes, and were followed by no bad symptoms. The intelligence of the child returned very soon afterwards. The only remedy used was a warm bath. The other cases have already been described.

When convulsions occur in the second or third stages, it is very important to ascertain whether they are not the result of some local disease. Two of the three cases that came under my notice accompanied violent attacks of bronchitis. The third was caused by congestion of the brain. Here the treatment must be directed against the local disease, if that can be detected. When, on the contrary, the convulsions seem to depend on nervous irritation, they may be treated with baths, revulsives, purgatives, and the careful administration of opium, as recommended by Sydenham, Copland, Rilliet and Barthez, and other authors, or of camphor, assafœtida, musk, or hyoscyamus. If accompanied by intense heat and great dryness of the skin, without local complications, cold or tepid lotions might also be tried.

ARTICLE III.

VARIOLA OR SMALL-POX.

Definition; Frequency; Forms.—Variola is an epidemic and contagious disease, characterized by an initial fever, lasting from three to four days, and followed by an eruption at first papular, then vesicular, and afterwards pustular: the eruption attains maturity in from six to nine days, after which the pustules are converted by desiccation into scabs, which fall off between the fifteenth and twenty-fifth days.

The *frequency* of the disease varies greatly in different years, because of its epidemic nature. It is far less common in childhood amongst the middle and upper classes of the community, than either measles or scarlatina, in consequence, no doubt, of the attention paid to vaccination. I have seen but two cases of the disease under fifteen years of age, in the space of fifteen years, whilst I have met with 263 of scarlatina, and upwards of 314 of measles. It prevails to a greater extent amongst the poor and destitute classes, who neglect the attention to vaccination necessary to preserve children from the disease. Dr. Condie (*Dis. of Children*, note, p. 86) states that 587 deaths under fifteen years of age occurred from this disease in the ten years preceding 1845, while in the same period there were 574 from measles, and 2154 from scarlatina.

I shall describe two *forms*, the *regular*, including the distinct or discrete, and the confluent varieties of most writers, and the *modified form* or varioloid. I shall afterwards treat of the *irregularities* and *complications* of the malady.

CAUSES.—The principal cause of variola is universally acknowledged to be contagion. It is generally admitted also that it is propagated at certain periods by epidemic influence.

It is not clearly ascertained at what period of its course the disease first acquires the property of infectiousness. Some assert that it is not until after suppuration is established. This is, however, to say the least, doubtful, and it is best, therefore, to take any precaution that may be necessary to prevent the extension of the disease from the moment that its real nature becomes apparent. There can be no doubt that the body may still impart the disease after death, and that clothes worn by the patient retain the contagious principle, unless freely exposed to the air, for days, months, and, it is said, even for years.

One attack protects the constitution, in the great majority of cases, against subsequent contagion. When persons who have once had the disease contract it again, it almost always assumes a much milder and less dangerous form.

The period of incubation, or the time elapsing between the reception of the poison and the onset of the malady, varies generally between nine and twelve days. It may, however, be more or less than the periods just mentioned.

SYMPTOMS; COURSE; DURATION.—*Regular form of the disease.*—I shall describe three stages of the disease: 1. That of the initial or eruptive fever; 2. That of the progress and maturation of the eruption; and,

3. That of decline or desiccation. In addition to these some writers make another stage, that of incubation, which includes the period between the introduction of the poison into the system, and the appearance of the first symptoms. This stage is seldom marked by symptoms sufficiently characteristic to enable us to detect the approaching disease, and in many instances is probably entirely unnoticed by the patient.

The *first stage*, or that of initiatory fever, commences generally in children with pains in the bones and loins, and sometimes with rigors or chilliness, accompanied with headache, and soon followed by fever. Nausea and vomiting often exist from the first, or come on soon after the appearance of fever and headache. At the same time there is loss of appetite, thirst, and more or less obstinate constipation. The tongue is red at the point and edges. One of the characteristic symptoms of this stage is pain in the loins, which generally dates from the first or second day, and which, though varying much in degree, is usually severe. The patients often complain also of abdominal pains, which seem to be colicky, and are referred either to the epigastric or umbilical region.

Fever and headache are the most constant of all the initial symptoms. The chilliness and rigors which frequently exist in adults, are not easily ascertained in the cases of children, and are therefore much less important. The fever varies greatly as to degree; the heat of skin is generally considerable; and may be accompanied either with dryness or moisture. The pulse is commonly full and frequent. The headache is usually frontal and often very severe. In some cases there are strongly marked cerebral symptoms, consisting of excessive restlessness and irritability, insomnia or somnolence, delirium, and even convulsions.

The various symptoms just enumerated continue up to the moment when the eruption begins to make its appearance, which happens generally in the course of the third day, though it may occur as early as the second, or as late as the fifth, sixth, or even seventh. In severe and confluent attacks, the eruption, as a general rule, begins earlier than in mild and distinct cases.

Second stage, or that of eruption.—Some time in the course of the third day after the invasion of the attack, the eruption usually begins to make its appearance in the form of small, isolated, and rounded red specks, which soon become projecting and solid, or in other words are converted into papules. The papules are from a third to two-thirds of a line in diameter, of a more or less vivid red color, and disappear under pressure, to return immediately when the pressure is removed. The eruption shows itself first on the face, and generally about the chin and mouth, and then extends to the rest of the face, to the neck, trunk, limbs, feet, and hands. It sometimes happens, particularly in very young children, that the eruption appears first about the genital organs, whilst in other cases it is first observed on the lower part of the loins, or upon the thighs. The papules increase gradually in size and prominence for one, two, or three days, and, as a general rule, some time in the course of the second day of the eruption, undergo a change into vesicles. This change takes place by the formation on the top of each papule, of a little transparent elevation of the cuticle, beneath which is deposited a drop of serosity. The conversion of the papules into vesicles occurs first on the face, and then on the neck, trunk, and extremities. The vesicles are at first smaller than the papules, and acuminated in shape, but as they grow larger, become gradually flattened and depressed in the centre; after a time they cover the whole papule, and before long exceed it in size. As these changes take place, the fluid they contain loses its transparency, becomes opaline, and by degrees the vesicles are transformed into pustules, and thus the third stage of the eruption or that of suppuration begins.

The pocks are more or less numerous, according to the extent and severity of the eruption. When scattered over the surface so as not to touch at their edges, the disease is said to be *distinct;* when, on the contrary, so numerous as to come into contact and run together, it is called *confluent.* Of these two varieties, the latter is necessarily more severe and dangerous than the former, in consequence of the greater extent of tegumentary surface inflamed. During the various changes the vesicles undergo, they are surrounded by small, inflamed areolæ, which differ in appearance according to the number of the vesicles. In cases of the distinct form, in which the eruption is sparse, so that the pocks are widely separated, the areolæ fade gradually into the natural color of the skin, at the distance of a third or two-thirds of a line or more from the base of the vesicles, whilst in those in which the eruption is more abundant, they run together, so that the spaces between the pocks are of a more or less bright red color. In confluent attacks, again, the areolæ are more or less imperfect, according to the manner in which the vesicles are grouped together.

The change of the vesicles into pustules takes place generally from the fourth to the sixth day of the eruption. During this process the fluid of the pocks becomes more and more opaque, whitish, and at length assumes a yellowish color, being in fact converted from serosity into pus. At the same time the pocks become larger, begin to distend, and as they approach complete maturation, gradually lose their umbilicated shape and become convex on the surface. The formation of the pustules follows the same course as did the vesicles, beginning on the face and extending thence to the neck, trunk, and extremities. The areolæ that have just been described as existing during the vesicular stage of the disease, continue during the early part of the stage of pustulation, but decline towards its termination, assuming as they disappear a purple tint. The number of pustules is in proportion of course to that of the vesicles, but from the increase in size of the pocks during the changes from papules into vesicles and pustules, the eruption, when at its height, seems to be greatly more extensive than would have seemed probable at the beginning of the first stage. As a general rule the pocks are most numerous on the face, and after that part on the neck and limbs. On the trunk the eruption is always much less abundant than on other parts of the body, and even when confluent in the highest degree on the face and neck, it is generally so only in patches on the limbs, while it is distinct on the thorax and abdomen.

Simultaneously with the eruption upon the skin, there occurs one also upon the mucous membranes, particularly those of the mouth, nasal passages, fauces, eyelids, and sometimes of the prepuce and vulva. It begins with more or less vivid redness of the membrane, which is followed by the production of little elevations, the real nature of which, whether papular or vesicular, seems not to be clearly determined. About the second or third day these red elevations assume the appearance of small, whitish, rounded, not umbilicated pseudo-membranous points, which last generally about five days, and are then detached, leaving usually a little ulceration or erosion, which heals without leaving a cicatrix.

A short time after the appearance of the pustules in the mouth and throat, a true inflammation of the mucous membrane of those parts takes place. When the gums are inflamed they become swelled, red, and spongy, and are dotted over with white pseudo-membranous points of a rounded shape. Sometimes the velum pendulum, and more rarely the tongue, present the same white points, with redness and injection of the membrane between. In most of the cases there is also partial or general inflammation of the pharynx, which occurs subsequently to the formation of the variolous pustules. The existence of this inflammation is denoted by more or less severe sore throat, attended with difficulty of swallowing, and with swelling and tenderness of the submaxillary glands. When the mucous eruption extends to the larynx, as often happens, there is pain in that part; the voice becomes hoarse or whispering, and there is a hoarse, laryngeal, smothered cough. The pharyngo-laryngitis just described occurs generally between the third and sixth days of the eruption, and ceases about the eighth or thirteenth. In some instances it does not exist at all or only to a slight extent.

During the eruption there is more or less inflammation and swelling of the subcutaneous cellular tissue, the degree of which depends on the extent of the eruption. The skin becomes tense, red, shining, and elastic under the finger, and more or less hot and painful. The swelling is greatest upon the face, where it commences about the fourth or fifth day of the eruption, and goes on increasing for five or six days, occasioning much pain, stiffness, and inconvenience to the child. The swelling diminishes when dessiccation begins, and ceases entirely as the latter is accomplished.

It is important to study carefully the general symptoms of the second stage. The fever which existed during the initial stage generally continues during the first day or two or three days of the eruption. When, however, the papules are fully thrown out, the fever subsides or disappears entirely, so that the pulse falls from 100, 120, or 140 beats, to 100, 80, 76, or 74, and the heat of skin diminishes at the same time. The child remains without fever usually throughout the vesicular period of the eruption, that is to say, until the fourth, fifth, or sixth day; during which time the appetite sometimes returns, sleep is tranquil and quiet, and the patient is in most respects well and comfortable.

About the fifth or sixth day of the eruption, at which time the maturation of the pustules is nearly completed on the face, and that process is commencing on the extremities, a new fever, to which the technical term *secondary fever* is applied, makes its appearance. The pulse rises again to 88, 100, 120, and 140, and becomes strong, hard, and full, whilst the skin is hot and dry. After continuing for some days the secondary fever diminishes as the suppuration is fully established, and disappears about the time that desiccation is nearly completed on the face, and has commenced upon the limbs. It ceases generally, therefore, about the ninth or eleventh day, having lasted between four and six days. This attack of fever is evidently the consequence of the suppurative stage of the disease, or of the conversion of the vesicles into pustules.

Towards the termination of the second stage, at the very height of the disease, when the pustules begin to break and discharge their contents, the patient exhales a peculiar, disagreeable, and fetid odor, which is characteristic of the disease.

The *third* or *declining stage* is that of the desiccation or drying of the pustules and their desquamation. The desiccation commences generally between the sixth and ninth days, and terminates between the tenth and fourteenth. The formation of the crusts begins upon the face and extends thence to the neck and limbs. It does not reach the limbs usually until about two or four days after it had commenced on the face. The mode in which the drying of the pustules takes place is not the same in all. In some a dark point is formed in the centre which gradually extends and converts the whole pustule into a hard crust; in others the whole surface dries at the same time; while in others again, the epidermis gives way and allows the contained fluid to escape, which then hardens into yellowish, irregular crusts, which become brown before they fall of. Some of the pustules, particularly those upon the arms and legs, do not form scabs at all, but shrink away from the absorption of their fluid, leaving behind nothing but pellicles of cuticle, which fall off by desquamation.

The desquamation or falling of the crusts begins from the eleventh to the sixteenth, and ends somewhere between the nineteenth, twenty-fifth, and even fortieth days of the eruption. When the scabs fall off the appearances presented by the skin beneath vary in different cases. In some a true ulceration and loss of substance of the derm has taken place, which gives all the characters of a suppurating ulcer when desquamation has begun early in the disease; when that process occurs at a later period, the ulcer is found to be dry and cicatrized. In both these forms of desquamation, the cicatrices form little pits or depressions, which remain during life. In other instances the fall of the scabs leaves red and excoriated surfaces which are on a level with the surrounding skin, but which soon dry, leaving blotches of a reddish-brown color, that do not disappear entirely for months. No cicatrices remain when desquamation takes place in this manner. In a third series of cases the crusts do not fall until the surfaces beneath have completely cicatrized, and the only traces left behind are more or less deeply tinted reddish spots, with occasional slight furfuraceous exfoliation of the cuticle, all of which disappear entirely after a time without leaving pits or cicatrices.

To conclude the account of the symptoms of the disease, I have a few words to say in regard to the condition of some of the important organs throughout the course of the malady.

The *tongue* presents no appearances peculiar to the disease, other than the eruption already described. It is generally moist, more or less furred, and either pale or red in color. The *abdomen* usually remains soft and undistended, though in some instances it is slightly tumid and hard, with occasional pains in the epigastric, umbilical, or iliac regions; in simple cases, the latter symptoms rarely last more than a short time, and when otherwise they are almost always the sign of some complication. The *constipation* which exists during the initiatory stage generally continues throughout the disease, though in some instances a slight diarrhœa occurs about the end of the first or second week, after which the bowels regain their natural condition. If severe diarrhœa should make its appearance, it is almost always the sign of a dangerous complication. The *nausea and vomiting* which are so often present during the initial stage, cease after the appearance of the eruption, and recur only in rare cases, or in consequence of some complication. The *appetite* is almost always lost during the course of the disease, though it sometimes returns in the period between the termination of the initial and the commencement of the secondary fever; *thirst* is acute as a general rule, and more or less so, according to the violence of the fever.

The *strength* of the child is not, as a general rule, greatly diminished, except in severe and dangerous cases. *Restlessness, irritability, crying, and delirium*, which are of such frequent occurrence in the febrile diseases of children, are not usually very strongly marked in regular cases of variola. They exist, but it is to a moderate extent only. In severe, irregular, and confluent cases, on the contrary, restlessness, crying, and delirium, are present in a very high degree, either towards the termination of the attack, or throughout its course, and they are then of very bad augury.

I shall here conclude the history of the symptoms of the regular form of the disease. I have not attempted a separate account of the distinct and confluent cases, believing them to be merely different degrees of the same affection; the latter being much more severe and dangerous, from their greater intensity, than the former. I will remark merely that all the symptoms are very severe in confluent cases, particularly the fever and those which indicate disorder of the nervous system.

I shall proceed next to a description of some of the *irregularities* of the disease, or, as expressed by some writers, of *irregular* or *anormal* variola. I would remark in the first place that a large number of the cases that have been called confluent, ought rather to be called irregular, since many of the symptoms detailed as belonging to that form of the affection, depend, not upon the confluent nature of the eruption, but upon the existence of some irregularities in its characters, entirely independent of the confluence or running together of the pustules.

The first or initial stage of irregular variola may be either longer or shorter than in the regular form. As a general rule, the symptoms of this stage resemble very closely those of the regular form, when the attack occurs in a child previously in good health; whilst in secondary attacks they present differences which are more or less strongly marked. The most important of these are the greater infrequency of headache, vomiting, and of the lumbar pains; the presence of diarrhœa rather than constipation; the greater frequency of sleeplessness, oppression, and restlessness; and, as a general rule, the earlier appearance of the eruption.

The second or eruptive stage generally passes through its periods with much greater rapidity, so that the conversion of the papules into vesicles occurs as early as the first or second day, and that of the vesicles into pustules, between the second and fourth days. In some few cases, on the contrary, the eruption is retarded, and the papules may remain unchanged as late even as the fifth or sixth day. The progress of the eruption is so irregular sometimes that there may exist upon the same surface, papules, vesicles, pustules, and scabs.

The appearances presented by the eruption often differ widely from those which have been described as characteristic of the regular disease. The papules may be pale, irregular, uneven, and destitute of areolæ; and when this happens, the vesicles and pustules which follow usually present the same peculiarities. In other instances the papules and areolæ are of a purple-red color, and the vesicles, instead of being transparent or whitish, are also reddish, and appear to be filled with a bloody serum. The pustules in these cases also contain a sanguinolent fluid, and when broken, their contents escape and form bloody scabs. In this variety of the disease, which is called hemorrhagic, the papules and vesicles are very small; they are developed slowly, and remain flat and undistended, as a general rule, whilst in a few cases, they are of a larger size, but remain almost always flattened in shape and unfilled. The scabs, when they form, are thin, soft, easily detached, and leave beneath bleeding surfaces and scarred pits.

The fever of the initial stage rarely subsides in irregular variola, upon the appearance of the eruption, as it does in the regular disease; but, on the contrary, usually goes on augmenting. The distinction, therefore, into primary and secondary fever does not properly exist. Sometimes, however, a notable increase of fever does take place at the period when the vesicular passes into the pustular stage of the eruption. The fever is usually more violent in the form of the disease under consideration, than in regular attacks, the pulse being full and large, and rising as high as 160. In fatal cases it becomes small towards the termination. The skin is generally very hot and dry.

The appearance of the tongue, condition of the abdomen, appetite, thirst, and nervous symptoms, are of the same character as in the regular form, except that the signs which they present are more severe and unfavorable, particularly the delirium, agitation, and cries.

VARIOLOID, OR MODIFIED SMALL-POX.—This is a term now usually applied to the modified form of the disease, as it occurs in individuals who have been vaccinated, or who have already had the natural or inoculated disease.

The symptoms of this form of variola are, in general, the same as those of the regular disease, the only difference being in their greater mildness and shorter duration. The attack usually begins with slight fever, headache, languor, and sometimes constipation, which are followed in two or three days, by the eruption. The vomiting, lumbar pains, and different nervous symptoms which exist in regular variola, are not often present, or, if so, in a very slight degree. The eruption consists of papules like those of true small-pox, but usually they are few in number, and entirely distinct in their arrangement. The initial fever and other symptoms subside completely upon the appearance of the eruption, and the child often seems perfectly well.

The progress and character of the eruption are very similar to those of the regular form of the disease, with the exception that the changes are more rapidly effected, and, as a consequence, the duration of the attack is rendered by so much the shorter. The papules are converted into vesicles at a much earlier period,—as early as the first or second day. The vesicles soon assume a whitish, opaline appearance, become umbilicated, and in the course of the second or third day begin to change into pustules. The suppurative stage of the eruption, or maturation, is seldom accompanied by the same marked secondary fever as in the regular disease. When the fever does occur, it is generally very moderate, consisting merely in slight acceleration of the pulse and a little increased heat of skin, and in one or two days it disappears entirely. The pustules do not fill usually so well as in regular variola, and not unfrequently their contents are rather sero-purulent, than purulent, in the proper sense of the term. The third stage occurs earlier and goes through its periods more rapidly than in true small-pox; desiccation soon takes place, is speedily finished, and the falling of the scabs, which begins as early as the eighth day of the eruption, is usually completed about the twelfth or fourteenth. After desquamation is completed, the only traces of the disease left are reddish spots or blotches, which disappear after a time without leaving cicatrices. The whole duration of the attack is generally from ten to twenty days.

COMPLICATIONS.—The most frequent and important complications of variola in children, are inflammations of the mucous membrane of the lower half of the intestinal tube, ophthalmia, otitis, and different hemorrhages. In a smaller number of cases, attacks of bronchitis, pneumonia, anasarca, articular inflammations, subcutaneous abscesses, simple and pseudo-membranous coryza, angina, and laryngitis, and other eruptive diseases, occur at different periods of the malady.

Meningitis and encephalitis are very rare, so much so, that not a single instance occurred out of 112 fatal cases of the disease in the Children's Hospital, at Paris.

It is impossible for me, for want of space, to attempt a description of the various symptoms of the different complications just enumerated. Having mentioned the possibility and probability of their occurrence, I must leave the reader with the advice always to suspect the existence or approach of some one of them, when the symptoms, in any case, differ much from those which have been described as characteristic of the regular form.

ANATOMICAL LESIONS.—The characteristic lesions of small-pox are a certain deteriorated state of the blood, congestion of the internal organs, and the inflammation of the skin and mucous membrane constituting the eruption. The blood is found to be entirely liquid and serous, and of a dark color; or if coagula exist, they are small, soft, and very dark in color. The exceptions to this rule are those in which some acute and severe inflammation exists, under which circumstances the dissolved state of the blood is less marked, and fully-formed coagula are more abundant. The congestion referred to affects almost the whole system. The muscles are firm and of a deep red color; the membranes of the brain are strongly injected, the sinuses are filled with blood, and the cerebral substance presents numerous red points or dots. The vessels of the lungs contain a large quantity of blood, and the liver, spleen, and kidneys, are all deeply congested.

The condition of the mucous membranes is important. The pharynx, larynx, and trachea, present an eruption, or simple inflammation without eruption. The eruption exists under the aspect of small, circular, thin, and whitish pseudo-membranous points, scattered over the mucous tissue, and slightly adherent to it, beneath which that tissue is often observed to be red and inflamed. At a more advanced degree, and in severer cases, the false membranes have disappeared, and in their places we find circular ulcerations, which are either superficial, or they penetrate the tissue of the mucous coat and rest upon the muscular, or even pierce that and reach to the cartilaginous tissue beneath. In addition to these lesions are found inflammation of the mucous tissue with its consequences, redness, softening, thickening, and extensive deposits of false membrane, quite distinct from the appearances above described as characteristic of the eruption upon these tissues.

It has been a contested point whether a true vesicular or pustular eruption ever exists upon the mucous lining of the stomach and intestines. The general opinion appears now to be, however, that the changes observed in these organs cannot be ascribed to the formation either of vesicles or pustules. The appearances that have led some observers to consider them as the result of a proper eruption are the following. The follicles at the commencement and termination of the small intestines, and in rarer cases, of the large intestine also, present an abnormal degree of development appearing in the form of small hemispherical or pointed, and sometimes flattened projections, on which there often exists a dark, and sometimes depressed central point. At the same time the plaques of Peyer are often enlarged, more projecting than usual, softened, and red.

The *anatomy of the variolous pock* is important and interesting. When a vesicle is opened soon after its formation, it is found to contain nothing but a little serosity which is perfectly limpid and alkaline, while the skin beneath is red, softened, and moist. The umbilicated character depends on a filiform adhesion between the centre of the pock and the surface of the skin beneath. This adhesion is broken, when, at a later period, the pustule becomes globose in shape. About the period of the conversion of the vesicles into pustules, or very soon after the formation of the latter, the cavity of the pock will be found to contain a false membrane, which is of an opaque white color, soft and friable in its texture, and seated upon the derm in small isolated points. After a time these points enlarge, and meeting, unite, and form a soft pseudo-membranous disk, uneven upon its surface, and which either fills the pock completely, or is covered at first with serosity and afterwards with pus. This false membrane is secreted originally by the true skin. At a somewhat later period it forms an adhesion to the inner surface of the cuticle, while still later in the progress of the pock, it become detached from the cuticle, and remains loose and free in the cavity of the pustule, surrounded by the fluid contents of the latter.

DIAGNOSIS.—The most important point in the diagnosis of variola is its recognition during the prodromic or initial stage. The only symptoms that can be depended upon as indicating with any considerable probability the approach of the disease, are the simultaneous existence of fever, constipation, bilious vomiting, and severe pain in the back, in a child not previously vaccinated, and in whom there is no more probable mode of accounting for the symptoms enumerated. If, in addition to these circumstances, the disease be extensively prevalent at the time, and still more, if the child has been exposed to the contagion of the malady, the diagnosis becomes almost certain. After the eruption makes its appearance the diagnosis is seldom doubtful. There may be some doubt for the first few hours, but soon the enlargement of the papules, the subsidence of the fever, and then the change into vesicles, remove all uncertainty as to its real nature.

PROGNOSIS.—The prognosis of variola must depend very much upon the form which it assumes. The regular form of the disease generally terminates favorably unless some complication happens to occur, in which case the danger to life is greatly augmented. It is generally stated also that the distinct is much more favorable than the confluent form of the affection. MM. Rilliet and Barthez say, however, that all the cases of the simple (uncomplicated) confluent disease which they met with recovered. Irregular variola, on the contrary, is fatal in a large proportion of the cases. The authors just quoted state that only three recovered out of thirty-nine that came under their observation.

The varioloid disease is very rarely fatal.

The favorable symptoms in any case of variola are the occurrence of the disease in children previously in good health; the absence of any violent nervous symptoms during the initial stage; a proper duration of the first stage; and subsidence of the fever after the appearance of the eruption. When, in addition to these circumstances, the secondary fever is not too violent, and no complication arises, there is but little doubt that the patient will recover.

The unfavorable symptoms are the existence of severe nervous symptoms during the first stage; the occurrence of a thick and abundant eruption upon the face, indicating a probably confluent case; continuation of the fever after the appearance of the eruption, or a merely slight subsidence of it; delirium and other nervous symptoms during the secondary fever; and any irregularity in the appearance of the eruption, as paleness instead of the usual red color, a livid or purplish color of the pustule, imperfect development of the pocks, or their sudden shrinking without diminution of the general symptoms. It is scarcely necessary to say that many of these symptoms are indicative of the existence or threatened production of some complication, upon the nature of which must depend, after all, in great measure, our prognosis. The complications most apt to occur have already been considered in a previous article.

TREATMENT.—I shall begin my remarks upon the treatment of the disease with the following quotation from Dr. Gregory (*Tweedie's Lib. of Pract. Med.* Am. ed. vol. i, p. 332). "Before entering on the curative treatment of small-pox, therefore, it will be proper to recall to remembrance the peculiar nature of the disorder. It is a fever which *relieves itself* by superficial eruption. That eruption, even when too copious, cannot be diminished or checked in its progress by any effort of art; when moderate it requires not the interference of the physician." . . . . . "*Heroic* remedies are here wholly inapplicable, and the great object of art is simply to place the system under the most favorable circumstances for effecting what the old physicians called the concoction and elimination of the morbid humors."

The treatment of simple, uncomplicated small-pox ought, unless the attack be confluent, to be of the mildest character. Rest in bed, low diet, cooling drinks, some gentle laxative, and an occasional foot-bath during the first stage, are all that is required in most cases. When, however, the fever is considerable, and the child restless and complaining, we may add to these means a diaphoretic, as the saline or effervescing mixture, with small doses of sweet spirits of nitre, or spiritus Mindereri; or we may direct very minute doses of tartar emetic, from $\frac{1}{30}$th to $\frac{1}{80}$th of a grain for a child four years old, to be repeated every hour or two hours, or from one to three drops of the antimonial wine, with ten or twenty of sweet nitre, for a child of the same age, every two hours. Should either of these produce much vomiting, or any action upon the bowels, they must be suspended. If the fever be violent, either during the initial stage, or later in the attack, with a full strong pulse, great heat and swelling of the skin, severe headache, or signs of congestion of the internal organs, it will be proper to bleed, either generally or locally. General bleeding is preferable as a general rule, unless there be some local determination, in which event local depletion may be substituted; but even here venesection had better be resorted to in many cases, as more effectual and less annoying to the child than either cups or leeches. The amount of blood to be taken must depend on the age, constitution, and present strength of the patient. Having regard to the nature of the disease, it is best always to bleed less freely than in acute local affections. Under the circumstances just supposed, we are advised by Dr. Gregory to make use of purgative medicines every day. MM. Rilliet and Barthez, on the contrary, oppose their employment, as likely to occasion some serious intestinal lesion, and advise the use merely of mild laxatives or enemata to an extent sufficient to keep the bowels soluble.

When the eruption comes out slowly and tardily, remaining for an unusual length of time in the papular state, or forming small and flattened vesicles, the pulse being at the same time frequent and undeveloped, we may hasten its appearance by the use of a warm diaphoretic infusion, as balm or sweet-marjoram tea, with spiritus Mindereri, by putting additional covering upon the child, and by the employment of warm baths, of mustard foot-baths, and of mustard poultices to the epigastrium.

Dr. Gregory advises the employment of nourishing diet and gently cordial medicines, when the pustulation is profuse over the whole body. When the period of secondary fever is accompanied with symptoms of extreme debility, as feeble pulse, brownish tongue, coldness of the skin, typhoid expression of the countenance, subsultus tendinum, and general tremors, the treatment must consist in the use of nutritious diet, and of stimulants, as wine and brandy, carbonate of ammonia, and quinine or compound infusion of cinchona. Camphor, administered in doses sufficient to allay the disturbance of the nervous system, is an excellent adjuvant to the stimulants just mentioned. In cases of hemorrhagic variola, the above stimulating treatment must be made use of, in connection with the use of bark or quinine in large doses, and of some of the mineral acids. The quinine ought to be given in doses of a grain every hour or two, so that from six to ten grains may be taken every day.

Treatment of the Complications.—It may be stated, in general terms, that the treatment for the different complications is the same as that which is proper for them when they exist as idiopathic affections, with, however, the modifications rendered necessary by the nature of the general disorder. Thus, acute inflammation must be treated by antiphlogistics, used, however, with great care and reserve, in consideration of the length of time during which the patient must be sick, and the necessity there is for preserving his strength and maintaining a proper crasis of the blood, in order that he may be enabled to carry on the various changes in the disease requisite to effect a return to health. These remarks apply particularly to angina, laryngitis, bronchitis, pneumonia, entero-colitis, and ophthalmia. When the acute affection is only of moderate extent and severity, it is best, except in the case of intestinal inflammations, to depend upon a moderate employment of cathartics, of small doses of the antimonials in conjunction with diaphoretics, of gentle counter-irritants, and, when necessary, to make small detractions of blood by leeches. Nevertheless, it is undoubtedly proper, when the acute disease is severe and extensive, the child strong and vigorous in constitution and present health, the pulse full and strong, and the skin hot and red, to resort to general bleeding.

The treatment of the ophthalmia which so often threatens, and sometimes occasions great or irreparable injury to the eye, must be of the kind just recommended. In this complication the local treatment is exceedingly important. When ulcerations occur upon the cornea, they ought to be touched, if this be practicable, with solid nitrate of silver, sharpened to a point, or with a fine camel's hair pencil which has been moistened and rubbed over the nitrate of silver crystal to insure a caustic solution. When it is impossible to apply the solid caustic or the brush, we must resort to some collyrium. This may consist of a solution of nitrate of silver, a grain to the ounce, or of one or two grains of sulphate of zinc, with twenty or thirty drops of wine of opium, dissolved in an ounce of rose-water, two or three drops of either of which are to be introduced into the eye morning and evening. When the first solution is used, its strength should be increased after a few days to a grain and a half or two grains, or even more, to the ounce of water.

The complication of entero-colitis must be treated by the most careful attention to diet, the use of warm poultices to the abdomen, of emollient and anodyne injections, the internal administration of astringents and small doses of opiates, and when absolutely necesssary, by small detractions of blood by leeches. When the diarrhœa is severe, and the stools mucous or bloody, we may use with advantage the nitrate of silver internally or by enema, in the manner directed in the article upon entero-colitis.

The treatment of the convalescence from variola is important. The same rules apply to it as to other infantile and children's diseases.

Before terminating my remarks upon the subject of small-pox, it will be proper to give some account of the treatment of the eruption which has been recommended and practised, with a view to prevent the scarring and disfiguration which so often result from the ravages of the disease. Of the different means that have been employed with this view, there are two which are almost exclusively relied upon at present. One is to cauterize the pustules with nitrate of silver, and the other to make a mercurial application upon the part where it is desirable to cause the abortion of the eruption. The cauterization has been performed in two modes; by the application of the caustic to each pustule separately, or to masses of the eruption. It appears, however, that the first-named method is much the most preferable. To succeed perfectly, it is necessary to touch the derm forming the base of the pustule; so that the best plan is to remove or lift up a portion of the top of the vesicle with a lancet, and then to introduce into its interior the sharpened point of a stick of caustic. This operation is only certainly successful when performed on the first or second day of the eruption, though MM. Rilliet and Barthez have known it to answer as late as the third and fourth, or even fifth day. The process of cauterization is productive of acute pain, but does not increase the local inflammation, according to the authors just quoted, at least when applied to a small number of the pocks. They state that when applied to the pustules seated upon the edges of the eyelids, it is almost incredible to behold how great is the diminution of the œdema of those parts in a single day. The conclusion of these gentlemen is, that individual cauterization of the pustules with nitrate of silver does certainly cause them, as well as the surrounding tumefaction, to abort, and prevents them from leaving cicatrices.

The other method which has been employed to cause the abortion of the pustules and thus prevent disfiguration is, as has been stated, the application of some one of the mercurial preparations. The effects of this treatment are said to be an almost certain arrest of the development of the eruption, when it is used from the first or second, or not after the third day; the vesicles and pustules remaining small and isolated, and not assuming, or else soon losing, the umbilicated character. When applied early, while there are as yet but few vesicles formed, it prevents the development of new ones, and diminishes the accompanying swelling and soreness. When the application is removed on the seventh or eighth day, it is found that desiccation has occurred imperfectly, the surface presenting small soft scabs, or little whitish, soft elevations, consisting of the pseudo-membranous substance situated between the true skin and the new epidermis, the old cuticle having generally peeled off with the plaster. In some places a light rose-colored surface alone remains.

In regard to the success of this treatment in preventing disfiguration, I may quote the statement of MM. Rilliet and Barthez, that none of the patients upon whom they saw it tried presented any cicatrices, though several had had confluent small-pox, which pursued its usual course on the parts not covered by the application. Dr. Stewardson, of this city, made a considerable number of trials of this treatment at the Small-pox Hospital of this city in 1841–42. He gives his conclusions in the following words (*Am. Journ. Med. Sci.* January, 1843, p. 86–7): "From these experiments, it seems pretty evident that the mercurial plaster has a decided influence upon the small-pox pustules, preventing more or less completely their perfect maturation, and diminishing the concomitant swelling and soreness, the process of desiccation being completed without the formation of thick scabs, and the resulting cicatrices less marked than when the process of suppuration was left to pursue its natural course." . . . . . . "That by its use pitting may be entirely prevented, or the mortality from small-pox materially lessened, seems to me very doubtful, although had all the precautions above mentioned been taken, it is not improbable that the effects would have been still more decided."

The use of the mercurial application is attended with some inconvenience. In the first place it is difficult to keep it accurately applied, particularly in children, in consequence of the unpleasant sensations it occasions. In the second place, it not very unfrequently, according to

MM. Rilliet and Barthez, produces an eruption of hydrargyriasis or mercurial roseola, in about eight or fourteen days after the variolous eruption, or four or ten after the application of the remedy. M. Rayer, however, states this effect to be a rare one.

Dr. Stewardson says that he thinks no apprehension need be felt as to constitutional affection from the mercury, for scarcely ever were the gums even touched. I may state, however, that when in Paris in 1840, I saw this effect produced in a young girl at the Children's Hospital.

The method of its application is different in different hands. The French generally employ the emplastrum de Vigo cum mercurio. Dr. Stewardson prefers the strong mercurial ointment, either pure or rubbed down with an equal bulk of lard, spread upon a piece of thick muslin. The muslin is to be cut into the shape of a mask, with apertures for the eyes, nose, and mouth. It is secured upon the face by means of strings attached to its margin and tied across the back of the head and neck. It is important always for the success of the measure, that the application should be kept in close contact with the skin. To insure this Dr. S. employed a separate piece of muslin for the nose, which is the part most difficult to fit. With the same view the French authors recommend that the plaster should be cut in pieces to suit the different portions of the face, making one for the forehead, and others for the cheeks, sides and back of the nose, and upper and lower lips. Any spaces that may remain are to be covered with other portions of the plaster, and the whole secured with strips of diachylon. On account of the difficulty of applying the mercurial plaster, the following ointment was compounded by the apothecary of the Children's Hospital at Paris, and has been found to answer very well:

℞.—Mercurial ointment,	24 parts.
Yellow wax,	10 parts.
Black pitch,	6 parts.—Mix.

The application ought to be confined to the face, as that is the part which it is most important to save from disfiguration, and as it is better not to use it upon a larger surface than necessary, lest it might occasion the mercurial roseola, or possibly salivation. As a general rule, four or five days are sufficient, according to Guersant and Blache, to leave it in contact with the skin, in order to avoid the bad effects just referred to.

ARTICLE IV.

VACCINE DISEASE.

DEFINITION; SYNONYMES; HISTORY.—The vaccine disease is an eruption produced originally in the human subject by inoculation with the virus of a certain disease developed upon the udder of the cow. It is susceptible of propagation from individual to individual by inoculation, but is contagious in no other way, and it possesses the invaluable quality of protecting, with very great, though not with absolute certainty, those through whom it has passed, against small-pox.

Besides the name given above it is known by the titles of cow-pox, kine-pock, vaccina, and vaccinia.

Some knowledge of the nature of the vaccine disease, and of the power it possesses to protect the human constitution against small-pox, has been found to have existed in different parts of the world, but there can be no doubt that it is to the genius and patient research of Dr. Jenner that we owe the inestimable blessing of vaccination, since it was by him that its marvellous virtue was first demonstrated and proclaimed to the world. Dr. Jenner learned, at an early period of his life, that there existed a popular belief in Gloucestershire, in England, that persons who had contracted a peculiar vesicular disease from the udder of the cow were thereby protected from the attack of small-pox. Becoming convinced by a long course of patient observation, that this belief was founded in fact, he determined at last to try whether the disease might not be transmitted from one person to another, and thus increase immeasurably the utility of this wonderful protective means. On the 14th of May, 1796, accordingly, he vaccinated a child eight years old with matter taken from the hands of a milker who had received the disease from the cow. The experiment succeeded perfectly, the child having received and passed through the disorder in the most satisfactory manner. On the 1st of July following this child was inoculated with variolous matter, and resisted the contagion entirely, as Dr. Jenner had expected. It was not, however, until two years later, in 1798, —after additional experiments, that the results of his researches were published to the world. From this time the belief in the utility of vaccination, and its application in practice spread rapidly throughout England. In 1799 it was introduced into this country; in 1800 it reached France, and in the course of a very few years extended to all civilized nations.

Symptoms; Course.—It is very important for the physician to be thoroughly acquainted with the appearances presented by the vaccine disease in its various stages, since he is to judge by those appearances, whether the subject has had the disease in such perfection as to derive all the benefit from its protective power which it is possible for it to impart.

The first effect of the puncture by which the virus is introduced into the tissues, is to produce a very slight redness at the point where the operation is performed. This redness usually disappears within twenty-four hours, and there is left merely a little mark or scab at the point of insertion. On the third day after the operation we first begin to perceive the specific effects of the virus, in the shape of a small hardened point at the seat of the wound, surrounded by a faint, erythematous redness. Over this hardened point, which grows gradually larger, the cuticle is elevated on the fifth day into a vesicle, by a thin, transparent, and pearl-colored serous exudation. This vesicle soon becomes umbilicated, so that by the following day, the sixth, the depression in the centre, constituting the umbilicated character, is generally perfectly manifest, and at the same time the vesicle is surrounded by a very narrow ring of inflammation. The vesicle continues to increase in size, until on the eighth or ninth day it has reached its highest degree of development. At this stage the vesicle or pock is large, usually about one-third of an inch in diameter, and it projects very considerably above the general surface. Its shape is circular as a general rule, though not unfrequently it is oval, this depending apparently upon the mode in which the puncture has been made. The color of the pock is dull white or pearly, or sometimes it has a yellowish tint. The quantity of fluid contained in the cavity of the vesicle differs, of course, according to its size. The structure of the pock is found, upon careful examination at this time, to be cellular, the number of cells amounting, commonly, to eight or ten; very often there is a small, dark-colored scab on the very centre of the vesicle even at this period, though in other instances this is absent, the surface of the vesicle being formed exclusively of the thin and transparent cuticle. The scab just alluded to has seemed to me to consist of the little incrustation, formed at the point where I had introduced the virus by the drying up of the minute quantity of blood escaping after the puncture, and of the dissolved virus which had not been absorbed. I have often noticed that when the small scab just alluded to has been rubbed off the arm on the second day, the vesicle has presented no scab as early as the eighth day. On the eighth day the little ring of redness at the base of the pock, which has hitherto been very small and narrow, begins to enlarge so as to form the areola. This increases during the ninth and tenth days, forming a brilliant scarlet or dark red inflammatory circle of about two inches in diameter, and constituting one of the most strongly-marked features of the vaccine disease. The color of the ring is most intense at the edge of the vesicle, and then fades gradually to its outermost boundary. On the ninth and tenth days, in connection with the areola, the skin and cellular tissue on which the vesicle is seated, and that for a short distance beyond the margin of the latter, become hardened and tumefied, forming a solid knot or lump in the derm like the base of a furunculus. The inflammation which causes the areola is often so intense as to occasion the production of vesicles, which are almost always discoverable with the aid of a lens, and are sometimes distinctly visible to the naked eye. On the tenth day, the disease is usually at its height, and it is then of course that all its peculiar characteristics are most strongly marked. At this time the child, when of an age to describe its sensations, will often complain of heat, itching, and pain in the inflamed spot; the arm is heavy and not willingly moved, or it is moved with care and caution; there is, in a good many instances, some irritation and swelling of the axillary glands, and very frequently a decided febrile reaction may be noticed. In other cases, on the contrary, none of these symptoms will be present. The child is gay and cheerful, its movements free, quick, and unembarrassed, and it seems in all respects to be in its ordinary condition of health.

From the tenth day the disease begins to subside. The areola fades so as to have nearly disappeared by the fourteenth day; the fluid contained in the vesicle is gradually converted into pus, and the cellular structure of the pock is broken down, so as to form, by the thirteenth day, but a single cavity, in which the pus is contained; the process of desiccation is going on rapidly during this time, so that about the fourteenth day the vesicle has disappeared, and in its place there is a firm, hard scab, of the shape and size of the vesicle. This scab continues to harden for some days longer, and at the same time contracts somewhat in size and grows darker in color, until at last it is of a very dark brown or mahogany tint. It separates gradually from the tissues beneath, the separation beginning at the circumference, and falls off usually about the eighteenth or twenty-first day, leaving beneath a small ulcer, which soon heals, or else a cicatrix of the shape and size of the pock. The cicatrix is at first of a deep red or purple color, but fades gradually, until it becomes much whiter than the surrounding skin. The scar left by the vaccine disease is very characteristic, and is often, though not by any means invariably, indelible. To be at all depended on as a mark of the disease, the scar should be small, circular, of a smooth and somewhat shining appearance, and it should exhibit radiations and little depressions or pits. The depressions are supposed to have been caused by the cells constituting the pock in its early period.

There is rarely more than a very slight constitutional disturbance attendant upon the course of this disease. About the eighth day, a decided febrile reaction, attended with some unusual warmth of the surface, restlessness at night, and fretfulness of the temper, is often observed. In a few instances I have noticed distinct disturbance of the health about the third and fourth days; amounting only, however, to unusual irritability and discomfort through the day, and to wakefulness or disturbed sleep at night.

IRREGULARITIES AND ANOMALIES.—I have now described the regular course of a vaccination,—that which it pursues in a large majority of the cases. Certain variations from the above standard or typical course are frequently, however, met with, and require some notice. These variations may consist merely in the degree of severity of the local and general symptoms, or in the appearances presented by the pock, without affecting at all the validity of the disease; or they may concern the duration of the phenomena; or, lastly, they may be such as to call in question the validity of the disease, leaving us in some doubt as to whether it has protected the constitution against variolous attacks or not.

The severity of the local inflammation occasioned by the vaccination, and that of the general symptoms also, varies often to a considerable extent. In some instances, and especially when the virus employed has been procured recently from the cow, the specific inflammation proves very severe. I have seen the arm intensely red, and very considerably swelled, from the shoulder to an inch below the elbow, while at the same time the axillary glands were tumefied and tender, and the child very feverish and uncomfortable. This happened in three children, in all of whom I had employed the same virus; which, as I afterwards learned of the person from whom I obtained it, had been taken quite recently from the cow. It produced the same violent inflammation, moreover, in several other subjects in whom it was employed.

If the vesicle happens to be broken by accident soon after its formation, its appearances during the subsequent progress of the disorder will often be very different from those exhibited in subjects in whom no such accident occurs. The vesicle loses a portion of its contents; it becomes conoidal and irregular in shape, instead of being circular and umbilicated; it does not exhibit the pearly white and diaphanous color which belongs to it, but is yellowish and opaque; the areola is often premature and irregular in shape, and the scab is frequently small, uneven on the edges, and falls off at an unusually early period.

Occasionally there is observed in the course of cow-pox a papular eruption over the body of the child. This occurs usually between the ninth and twelfth days.

It is quite common for the disease to be retarded in its progress. The delay generally takes place in the appearance of the vesicle, this not showing itself until the sixth or eighth day, or, in some rare instances, not until the sixteenth, or even the twentieth, or forty-sixth day. The longest retardation that I have met with has been seven days. In this kind of retardation, the disease usually runs through its regular and natural phases after the vesicle has once made its appearance. In another kind of retardation the delay occurs in the vesicular and pustular stages of the affection, the papule appearing at the ordinary time, but the disease not reaching its height or maturity until the eleventh or twelfth day.

The forms of variation from the ordinary course of cow-pox just described, do not seem to be connected with any diminution in the protective power of the disease.

It sometimes happens that the operation of vaccination gives rise to a disease totally unlike the true vaccine disease, one which does not protect against small-pox, and which has therefore been called *spurious vaccine disease.*

It was formerly the custom to describe quite a variety of appearances as indicating with greater or less probability a spurious disease. Of late years, however, it is generally admitted that the spurious pock is of much less frequent occurrence than was at one time supposed, and that when it does occur, its characters are so marked as to make it easy of recognition. In fact, it happens in a very large majority of cases, that the vaccination either fails entirely, the puncture being productive of no other results than those which would naturally flow from a slight wound of the skin, or else that it is followed by a true and easily recognized vaccine pock.

When, however, the operation is followed immediately or within a day or two days by inflammation, and the appearance of a pustule, without the previous production of a vesicle; when this pustule is irregular in shape, yellow in color, acuminated, easily broken, and terminating in a soft, yellowish, ragged-looking crust, which falls off upon the fifth, sixth, or seventh day, there is assuredly reason enough to call the vaccination spurious, and it becomes the imperative duty of the practitioner to regard it as such until subsequent and repeated trials with other and fresh virus, have proved the child to be protected.

DIAGNOSIS.—There can be no difficulty whatever in distinguishing the vaccine disease when it occurs in its regular form. The successive phases through which the eruption passes, and the particular appearances which it presents in each stage, are so unlike all other diseases, except, indeed, small-pox, as to render it very easy of recognition.

Sometimes, however, there is a little difficulty in determining whether the eruption is spurious or regular. But this rarely happens except under circumstances in which we should expect some modification in the phenomena of the disease, to wit, when its course is interfered with by the effects of a previous vaccination, or of an attack of variola. The irregularities arising from these causes are such as might be anticipated, and will be described in the article on revaccination. Whenever, however, the disease fails, in any important respect, to exhibit the perfect attributes of a well-marked pock, both as regards its time of development, its changes, and its particular appearances at each stage, in a child not previously vaccinated, nor having had small-pox, the only wise and prudent plan to follow is to repeat the operation a few weeks after the doubtful one, so as to test thereby the protective power of the first.

PROTECTIVE POWER.—Though vaccination has not proved so sovereign a means of protection against variola as it was at one time hoped it would, I have always thought that those who deny, or even question in a serious way, its incalculable benefit to the human race, as some have recently been found to do, deserve to be classed amongst the blindest and most unphilosophical, or worse still, the most ungrateful of mankind, for thus refusing to a kind Providence that meed of earnest gratitude which they undoubtedly owe. For, though a single vaccination may fail to afford perfect immunity against variola, the attacks of the disease which follow even a single vaccination, are, in a large majority of cases, neither dangerous to life, nor are they followed by deformity of any kind. Moreover, a primary vaccination almost always affords perfect protection up to the age of puberty, thus preserving our race from a loathsome and dangerous malady, precisely in that period of life during which nearly all diseases prove most inimical to life. A single fact from my own experience will serve to show how great is the debt we owe to vaccination, and ought to silence every cavil against this greatest of all prophylactic means granted to man. This fact is, that during the last sixteen years, in which time I have been constantly and busily occupied in practising amongst children, I have met with but two cases of natural small-pox under fifteen years of age, and these occurred, one in a child two and a half years, and the other in one three weeks old, neither of whom had ever been vaccinated; nor have I, during that time, seen more than three or four cases of modified small-pox or varioloid, under the age specified, though three well-marked epidemics of variola have prevailed during these eleven years. When we consider, too, that recent observation has shown that the practice of revaccination somewhere about the age of puberty, or soon after, has almost always been sufficient to restore to the constitution that exemption from small-pox which may have been more or less diminished after a primary vaccination performed in infancy, our admiration and appreciation of Jenner's discovery cannot but be raised still higher.

SUSCEPTIBILITY TO THE DISEASE.—The susceptibility to the vaccine disease varies greatly in different persons and different families, and is modified to a greater or less extent by the existence of other diseases in the individual at the moment of the operation. In some it is said never to be received, no matter how frequently or how carefully the virus may be inserted. In others it is received with difficulty, requiring several repetitions of the operation before it can be made to take; whilst in yet another class of subjects, the smallest amount of virus, when inserted in a careless and imperfect manner even, will produce the disease with the greatest certainty. It may be safely asserted, however, that a large majority of children take the disease after a single operation, if this be performed with ordinary care and nicety. No explanation of the different susceptibilities of individuals to the disease can be given. The same difference is known to exist in regard to other contagious and even epidemic diseases, as measles, scarlatina, pertussis, variola itself, typhoid fever, malarious affections, and cholera.

The susceptibility varies also in the same person at different times, without its being possible to ascribe this fact to any evident cause, since the child may appear on both occasions to be in the same condition as to health and other circumstances likely to influence its susceptibility to the contagion. Thus, I knew a child a few months old to be vaccinated four times, twice by my father and twice by myself, each operation following rapidly the preceding one, without success, though the virus was known to be good from its having succeeded in other subjects, and though it was changed each time. The child appeared to be in perfect health. There was no eruption of any kind upon its surface, nor any other condition that could explain its insusceptibility. After the fourth operation, the attempt was suspended for about four months, then renewed by my father, and with instant and entire success. In another case, the varying susceptibility of the same individual to the disease was still more strikingly exemplified. An infant, a few months old, was vaccinated four times in succession from the scab without success. It was then vaccinated with fresh lymph taken from the arm of an infant who was undergoing the disease. This also failed. A few weeks after this, the operation was again performed with the dried scab, and this time with perfect success.

Certain eruptions existing previously upon the surface, have seemed to me to prevent the reception of a vaccination. The eczematous and impetiginous diseases of infancy and childhood have certainly had this effect in my experience, though M. Taupin (*Dict. de Médecine*, t. xxx, p. 406) is of the contrary opinion; he having found that the disease has been merely retarded when the operation was performed during the initial stage of the eruptive fevers, whilst its course was suspended even entirely when any of these affections occurred in a child already vaccinated, to be resumed again after the cure of the eruptive fever.

·There is another circumstance concerning the supposed effects of other diseases on the vaccine affection, to which it will be well to draw attention. I am sure there are few practitioners, having any considerable amount of business, but must have been annoyed, and injured perhaps in their reputations, by the notion so prevalent in the community, that vaccination may impart to children other diseases. This prejudice exists particularly in regard to the chronic cutaneous eruptions of infancy and childhood, so that I have frequently had parents to insist to me that the impetiginous or eczematous disease under which their child might be laboring, has been caused by the vaccination, performed perhaps recently, or even months before. M. Taupin, quoted by MM. Guersant and Blache (*Dict. de Méd.* t. xxx, p. 414) vaccinated a large number of children at the Children's Hospital in Paris, with virus taken from subjects affected with itch, scarlatina, measles, varicella, varioloid and variola, rachitis, scrofula, tubercles, chronic eruptions of the scalp, dartres, &c., without communicating to the patient any of these affections, either those of acknowledged contagious or non-contagious nature. A very curious case illustrative of this point is mentioned by Dr. Gregory in his "Lectures on the Eruptive Fevers" (*Am. Edit.* New York, p. 270). "A child, who had been exposed to the infection of small-pox, was vaccinated. Both diseases advanced. A lancet, charged with lymph from the vaccine vesicle, produced cow-pox. Another lancet charged with matter from a variolous pustule, *formed within the vaccine areola*, communicated small-pox." I mention the result of these experiments in order to show how little foundation there is for the popular notion above alluded to, and to give to the practitioner an argument with which to defend himself against the unjust accusations of those who may assert his vaccination to have been the cause of any disorder that may have followed upon it. Not that I would myself employ virus taken from a child suffering from disease of any kind whatsoever, since this is, to say the least, unnecessary, and ought to be avoided. Indeed, I have never employed a vaccine crust taken from a child who was not apparently in perfect health. The smallest amount of cutaneous eruption upon a child has always been sufficient reason with me to reject the virus afforded by such a patient, and as this *must* be the safest plan to adopt, it is of course the proper one.

OPERATION.—Different methods of inserting the vaccine virus have been employed by different practitioners. The two methods most frequently resorted to are those by incision and puncture. The former consists in making a superficial incision of several lines in length into the skin, in such a way as to cause a very slight effusion of blood. Into this is introduced a small quantity of a dried vaccine scab reduced to a fine powder, or a piece of fine thread wet with the vaccine fluid or with water holding in suspension a portion of dried virus. Over the wound is then placed a piece of isinglass plaster, which is secured by a bandage. This is to be removed after two or three days, and the disease allowed to pursue its regular course. The operation by puncture is performed by introducing horizontally beneath the skin a needle or lancet charged with the virus, and then withdrawing it in such a way as to leave the virus in the wound. Of these two modes the latter is the one now almost universally adopted, the former having been found to occasion, not unfrequently, a spurious disease, and to be of very difficult application in the cases of children. For my own part I have used for some years past a method that I have found much the most convenient in children, and which rarely fails when it is carefully performed. I take a common thumb lancet, which should not be too sharp. Holding the arm of the child with my left hand, and stretching the skin between the forefinger and thumb, whilst the under part of the arm is grasped by the second finger placed beneath the first, I lay the lancet flat upon the skin, and using the point, remove, by a repeated and very gentle rubbing movement, the cuticle, until the surface of the derm is laid bare, so as to allow of a perceptible, and merely perceptible oozing of blood, or, in other words, so as to expose a living surface. This surface should be about as large as a small-sized bird-shot, and it should not bleed, but merely show that the vascular part of the derm has been reached and slightly exposed. On this surface the vaccine fluid or dissolved scab is to be placed in quantity sufficient to cover it, and the nurse should be told to leave the arm bare and untouched for twenty minutes, or until the applied fluid has dried into a little scab, when no further precautions are necessary. This mode of operating may at first seem tedious and painful. I can only say that when performed gently and gradually, it causes so little pain that I have often practised it upon sleeping children without waking them.

It was at one time thought necessary to make several punctures in order to insure a successful inoculation, some making two, and others as many as five. In this city one only is generally made, and is found to answer every purpose. When, however, there has been any difficulty in making the child take the disease, I have on several occasions succeeded better by making two insertions, one being situated about half an inch or an inch below the other; nor have I found that the local inflammation or general symptoms have ever been severe enough to cause me to regret this mode of operating.

The place usually selected for the operation is, as every one knows, on the arm, close to the insertion of the deltoid muscle. This is the best place as a general rule, and particularly in girls, whose parents often object to having the insertion made below this, lest the scar should be visible in after years, when the arm is uncovered. In boys I often select the radial edge of the forearm some two inches below the elbow, since in this place the pock is least apt to be injured in the act of dressing the child, or of lifting it about.

REVACCINATION.

That the prophylactic influence of a primary vaccination is diminished, and in some instances entirely lost, by the progress of time, has been most positively and clearly shown by the observations of latter years. To prove the truth of this it is merely necessary to state, that almost all recent writers on the vaccine disease recommend a recourse to revaccination some years after the first operation. With the view of bringing this matter fairly before the reader, I will quote the opinions expressed by some of the leading authorities of the day.

Dr. Gregory (*Loc. cit.* p. 346) says: "The practice may be recommended for its safety, even if it be much less serviceable than the Germans contend for. We have sufficient facts before us to state that it need never be recommended prior to the tenth year of life, and that the age best fitted for it is from the period of puberty to that of confirmed manhood." Guersant and Blache (*Dict. de Méd.* deux. ed. t. iii, p. 435) have revoked their first opinion that revaccination was unnecessary, and state that they now believe firmly "that its protective power becomes enfeebled and does not preserve the individual from contracting variola in a more or less favorably modified form; and that in consequence revaccination ought to be zealously recommended and propagated." The Academy of Medicine of Paris, consulted by government upon this question some years since, determined that revaccination was unnecessary. In February, 1845, however, the same learned body, after reconsideration of the matter, arrived at different conclusions. Two of these I shall quote. "Revaccination is the only method of proof which science possesses of distinguishing persons who have been definitely protected by vaccination from those who are so only in various degrees."

"The trial by revaccination does not constitute a certain proof that those of the vaccinated in whom it succeeds were liable to contract variola, but only a tolerably strong presumption that it was amongst them particularly that the disease would have been apt to occur. In ordinary periods revaccination ought to be performed after the fourteenth year of life; when the disease is epidemic, it is prudent to resort to it earlier." (Guersant and Blache, *Loc. cit.* p. 436.)

MM. Rilliet and Barthez say (t. ii, p. 538): "The diminution of the protective power of vaccination, after a certain number of years, seems to be positively proved, but it is proved also that this diminution is almost nothing during the period of life which concerns us." Dr. Condie says (*Dis. of Children,* 2d ed. p. 466): "If, therefore, the facts upon record are perfectly accurate, and there is no reason for suspecting them to be otherwise, they afford conclusive evidence of the necessity and importance of revaccination, in all cases in which persons are liable to be exposed to the infection of small-pox." It is scarcely necessary to remark that all individuals residing in a district in which the disease is prevailing, are exposed to the infection, and, therefore, according to the above quotation, all ought to be revaccinated, which is what I am seeking to establish. Dr. George B. Wood, to whose work on medicine I would refer the reader for a very accurate and full account of vaccination and revaccination, terminates his remarks on the latter subject with the following paragraph. "In concluding the subject, I would again strongly urge the propriety of universal revaccination, as the means not only of promoting the comfort and possibly of saving the life of the individual, but also of preventing the spread of small-pox, and of ultimately eradicating it, if not from the globe, at least from extensive communities."

I might quote, in further proof of the propriety and necessity of revaccination, many other evidences emanating from various sources, but with the following short account of my own experience in regard to it, I shall bring my remarks to a close. In the year 1845 I revaccinated 63 persons, of whom 9 had the disease with every appearance of regularity, that is to say, the puncture did not become irritated until the third or fourth day, the vesicle was perfect on the ninth, with the umbilicated centre, hard base, and scarlet areola, and after that period the inflammation subsided rapidly. Of these 9, all but one had characteristic cicatrices of previous vaccinations on the arm. The ninth was doubtful, but the individual insisted that he had been properly vaccinated. Of the remaining 54 cases, the great majority presented more or less strongly marked signs of the disease. In nearly all a yellowish pustule was formed some time during the second day, which was surrounded by an irregular patch of redness of small extent, presenting often a dotted or marbled look. In some the appearances promised a regular vaccine vesicle for several days, but terminated suddenly by the drying up of the vesicle, and the formation of an ill-shaped acuminated scab, which soon fell off, leaving a slight scar quite different from that of a primary vaccination.

The only remaining point for consideration is the period of life at which revaccination ought to be performed. The prevailing opinion seems to be that somewhere about puberty is the most suitable time, unless in the cases of children exposed immediately to the infection of the disease, when it may and ought to be resorted to at a much earlier period.

ARTICLE V.

VARICELLA.

Definition; Synonymes; Forms.—Varicella is a contagious eruptive disease of benign nature, characterized by more or less numerous transparent vesicles following rapidly upon small red elevations. The eruption is usually preceded by slight initial symptoms lasting from one to two days, and it terminates by the desiccation of the vesicles about the fifth or eighth day after their appearance.

It is known also in English by the names of chicken-pox, swine-pox, and crystalli.

Several different forms of the disease have been described by different writers under the titles of lenticular, conoidal, and globular, but inasmuch as these varieties are of no real importance in practice, I shall merely advert to them casually in my account of the eruption.

Causes.—Varicella is propagated in two ways; by *contagion*, and by *epidemic* influence. That it is contagious there can be no doubt, since nearly all observers agree upon this point. In my own experience I have seldom known any child, who had not had the disorder previously, to escape it when once it has entered a household. It rarely attacks any but children. Its epidemic nature is shown by the fact that in some seasons it is scarcely seen, whilst in others it prevails extensively over large districts of country, and attacks many children in the great towns and cities of those districts. Varicella occurs only once in the same individual.

Considerable discussion has taken place at various times as to the real nature of varicella, some asserting that the disorder is merely one of the varieties of modified small-pox, while others maintain as strenuously that it is an independent and specific disease. The weight of authority, however, seems to be clearly in favor of the last-mentioned opinion, and I have no hesitation in avowing this to be the conclusion to which my own reading and experience have brought me. When we consider, indeed, that varicella is, unlike either variola or varioloid, incommunicable by inoculation, that it attacks indifferently the vaccinated and unvaccinated, that its course is entirely unaffected by previous vaccination, and that the vaccine disease is readily taken, and passes through its regular phases after varicella, I do not see how we can refuse to believe that the latter is something entirely independent of small-pox, and therefore a distinct and peculiar malady.

Symptoms; Course; Duration.—The eruption is usually but not always preceded by prodromic symptoms. These seldom last more than one, or at most two days, and consist at the very beginning of slight chilliness, or of a chill even, which is followed by a more or less marked febrile reaction. In some instances there is vomiting, but this is rare, and when it does occur, slight. When fever exists it is marked by headache, accelerated pulse, slight warmth of the surface, pain in the back and limbs, languor, indisposition to play, some unusual irritability of temper, diminution or loss of appetite, and unusual thirst. These symptoms may be present, and yet in so mild a shape that the child shall show no disposition to abandon its ordinary habits of activity and play, while in other cases again, there are literally no initiatory symptoms whatever, and the appearance of the eruption is the first declaration of the presence of the malady. Even when constitutional symptoms are present, they usually disappear by the third day.

The eruption appears in the form of small papular spots, of a deep red color, and irregularly circular shape, which generally show themselves first on the front and back of the trunk, and extend very soon to the face, and a little later, to the extremities. I have known a child to go to bed at night with slight headache and fever, and present a well-marked though not yet abundant varicellous rash upon the upper part of the trunk, and on the face, on the following morning. These papules exhibit, in the course of a very few hours, small vesicles in their centres; indeed, according to some observers, the eruption is vesicular from the very beginning. On the second day the papules are in great measure converted into vesicles, which may be either small and acuminated, constituting the lenticular form of the disease, or they may be larger and of a more globular shape, constituting the conoidal and globular or globose forms of Willan and Bateman. I deem it unnecessary, as above stated, to describe different varieties of varicella, since this is useless for any practical purposes, and because I constantly see upon the same subject vesicles of very different shape and size. When fully completed, the vesicles are often of very considerable size,—two or three lines in diameter; they contain a transparent fluid, which is either entirely colorless or of a faint orange tint, and some of them are surrounded by a small ring of inflammation. On the third day, the eruption continues in nearly the same state as on the second, except that the fluid contained within the vesicles assumes a yellowish appearance, owing to its passage from the serous into the purulent condition. On the fourth day the process of desiccation begins and goes on rapidly, the vesicles that have not been broken by accident, or torn by the fingers of the child in its efforts to appease the itching which they give rise to, assuming a shrivelled and shrunken appearance at their margins. As this process goes on the vesicles are gradually converted into light brownish scabs, so that by the sixth day they are nearly all dried up. The scabs are usually thin; they dry from the circumference to the centre, and between the eighth and ninth day fall off, leaving behind faint red spots, not depressed below the general surface, and which soon disappear.

The eruption is generally accompanied, as was stated above, by a sensation of heat and itching in the vesicles, which causes the child to rub and scratch them in such a way as often to break those which he can reach, and thus prevent them from passing through the regular periods of maturation and desiccation.

DIAGNOSIS.—There is but one disease with which varicella could be confounded, and that is variola in some of its shapes. With regular small-pox such a mistake could scarcely happen even to the inexperienced. With varioloid, on the contrary, there might be some difficulty, and yet, if it is borne in mind that in varioloid the initiatory fever is much more severe, lasting three or four days instead of twelve or thirty-six hours, that the eruption appears first on the face and extends very slowly to the trunk and extremities, and that the conversion from the papular into the vesicular condition is much more gradual than in chicken-pox, I think no serious difficulty can ever occur in making the distinction between the two affections.

Prognosis.—The prognosis is always favorable. The only real trouble that I have ever known to occur has been from catarrh or pneumonia contracted by imprudent exposure during the convalescence.

Treatment.—In a large majority of the cases, varicella requires no treatment beyond attention to diet for the first two or three days, and the avoidance of cold during the convalescence. When the constitutional symptoms are marked, the fever and headache being considerable, a dose of some mild cathartic, a little sweet spirits of nitre in cold lemonade or orangeade, rest in bed, and one or two foot-baths, will be all that is necessary to reduce these symptoms and make the patient comfortable.

CLASS V.

DISEASES OF THE SKIN.

INTRODUCTORY REMARKS.

It would be worse than useless in a work like the present, which is necessarily restricted within certain limits as to size, to attempt a full description of all the diseases of the skin to which children are subject. Such a course would compel me to devote to more important matters than the affections of the skin, a much smaller proportion of space than they require and deserve. I shall therefore select only those cutaneous diseases occurring in early life, which are most important either from their frequency, or because they present in children some particular aspects or peculiarities, which make it necessary that they should be studied separately from the same maladies in adults. Moreover, I shall treat of each one as it comes before us with greater or less copiousness of detail, according to its respective consequence to the medical practitioner, eschewing carefully any useless detail in regard to the more unimportant kinds, but endeavoring anxiously to describe with accuracy the history, diagnosis, and treatment, of such as demand a greater degree of consideration.

CHAPTER I.

RASHES.

ARTICLE I.

ERYTHEMA.

Definition; Frequency; Forms.—Erythema is a non-contagious exantheme, characterized by a slight and superficial redness of the skin, appearing in patches of irregular form and uncertain extent. It may or may not be preceded by or attended with signs of constitutional disorder. It is quite a *frequent* affection in some of its forms.

I shall describe three *forms* of the disease, restricting myself, as I have already said that I should, to those which seem particularly important in infancy and childhood. These forms are *Erythema Fugax*, *Erythema Intertrigo*, and *Erythema Nodosum*.

ERYTHEMA FUGAX.—This form of erythema occurs chiefly in the course of various acute internal inflammations, and especially those which occur during dentition. It may occur during high febrile reaction brought on by any cause, especially in children having an active cutaneous circulation. I have observed it several times in the local inflammations accompanied with great disturbance of the circulation, and particularly in a case of severe catarrh occurring during dentition, and in attacks of severe simple angina. In these cases it appeared in the form of a bright red rash, resembling very much a mild scarlatinous eruption. It was seated upon the upper part of the front of the thorax, and upon the outer surfaces of the arms. The red flush disappeared readily under pressure, and flashed back the moment the pressure was removed. There was no swelling whatever attending it, and the color was never so bright as that of a severe scarlatina, nor so deep as that of erysipelas or roseola. It lasted only a few hours or half a day, and then disappeared without desquamation.

The chief point of interest in regard to this form of erythema, as it has come under my notice, has been the diagnosis between it and scarlet fever. This is to be made out only by recollecting that it has made its appearance in the course of another disease, while the child is already suffering under some kind of sickness, which is not generally the case with scarlatina; by the less scarlet tint of the eruption, its more superficial character, and more limited extent; and lastly, by its short duration.

ERYTHEMA INTERTRIGO.—This form of erythema was for a long time, and is still by some, known by the single name of intertrigo. It occurs on the portions of the body exposed to friction by the contact of opposite surfaces, and to irritation from the passage over, or retention upon them, of the urinary secretion or the fæcal discharges. The most common seats of it are, therefore, in the folds of the skin about the neck, in the axillæ, the groins, about the anus, in the cleft of the nates, and on the inside of the thighs.

As it appears in the creases of the skin about the neck, or in the axillæ, it may be a mere red blush lasting a few days, and then disappearing; or, after presenting this appearance for a short time, the inflammation may become much more intense, and occasion an excoriated condition of the surfaces attended with the discharge of a serous or a sero-purulent fluid; or, lastly, the inflammation may run into veritable ulceration, giving rise to extensive and very painful ulcers occupying the depth of the crease, presenting abrupt and jagged edges, and discharging very considerable quantities of pus. In one child, two months of age, of delicate constitution, and imperfectly supplied with food, I saw the last-described form of the disease occupying at the same time the groins, the axillæ, and the folds of the neck. The attack lasted two weeks, and very nearly proved fatal from the violent suffering it caused. In another child, not quite a year old, who was teething, it presented these characters in the neck and axillæ, while in the groins it was much less severe, the latter parts being merely excoriated.

Infants attacked with severe diarrhœa, with dysentery, or entero-colitis, and especially with that form of entero-colitis which so generally accompanies thrush, are very apt to have an erythema of the nates, genital parts, and the internal surfaces of the thighs. So common, indeed, is this occurrence, that M. Valleix regards erythema of these parts as an almost constant accompaniment and even precursor of thrush. For my own part I have very often met with it in cases of diarrhœa in infants, even in those of very moderate severity, but I have never seen it precede the appearance of the intestinal disorder.

This form of erythema begins as a simple redness of the skin about the anus, between the buttocks, about the genital parts, and over the inside of the upper parts of the thighs. In a mild case of diarrhœa, and in a child properly cleansed after each evacuation by stool or urine, it will go no further than this: but in a severe attack of inflammatory diarrhœa, attended with frequent acid stools, and in a case in which proper cleanliness is not attended to, the long-continued contact of the discharges and soiled napkins will often cause the erythema to assume very distressing features. The redness extends in such instances along the leg to the feet; small papules, more or less numerous, make their appearance upon the inflamed skin; these are converted into pustules and then into ulcerations, and if the case goes on unchecked, the ulcerations become larger, run together, and present raw, deep red, and bleeding surfaces, sometimes of considerable size. Very often the ulcerations present a grayish plastic exudation upon their surfaces. After cicatrization there remain at the points where the ulcerations had existed reddish and copper-colored spots, which do not disappear for a considerable length of time. This form of erythema rarely ceases entirely until the diarrhœa which has occasioned it has itself been cured.

ERYTHEMA NODOSUM generally occurs in feeble and delicate children. I have never met with it under five years of age. It may develop itself upon different parts of the body, but occurs in by far the greater part of the cases on the forepart of the legs, or over the anterior edge of the tibia. I have only twice seen it elsewhere, and then it was situated upon the outer surfaces of the arms and forearms. It is preceded usually for several days by general indisposition, by lassitude, thirst, loss of appetite, and some feverishness. It appears in the form of red spots of an oval shape, somewhat elevated in the centre, and which increase gradually in size. After a short time these patches become decidedly elevated above the surrounding surface, and in passing the hand over them they give the sensation of nodosities. They increase gradually in size so as to measure from a few lines to an inch or an inch and a half long, by half an inch or an inch broad, when they present the appearance of reddish tumors, somewhat painful to the touch, and having an obscure feeling of fluctuation, as though about to suppurate. This, however, they never do, but after a short time they diminish in size, their red color changes into a bluish or livid tint, they soften, and finally disappear entirely in about twelve or fifteen days. I have met with five well-marked cases of this disease. Three occurred in girls between six and twelve years of age, and two in boys of the same age. They all appeared to depend on derangement of the digestive function, attended with a somewhat impoverished state of the blood, and general debility.

Diagnosis.—The only disorders with which erythema could be confounded are erysipelas, roseola, or scarlatina, and this could happen only in regard to the erythema fugax. From erysipelas it may be distinguished by the superficial character of the eruption, the absence of swelling and of smarting and burning pain, and by the slighter severity and much shorter duration of the symptoms in erythema. Another important feature is the peculiar, abrupt, well-defined, and slightly elevated margin which marks the edge of the erysipelatous rash, and which does not exist with the same distinctness in erythema. Lastly, the singular regularity observed by erysipelas in its gradual extension from place to place, is altogether unlike the march of erythema, which shows itself suddenly, or in a few hours, over large surfaces, and after lasting some hours or a few days, disappears without having followed the erratic course of erysipelas.

In roseola the peculiar deep rose-tint of the rash will serve to distinguish between it and the lighter red tint of erythema.

The mild character of the general symptoms and the absence of throat-affection in erythema, will prevent any one who is careful from mistaking the disease for scarlatina.

Erythema intertrigo cannot be mistaken for any other disease, and if the course and peculiar local characters of erythema nodosum be borne in mind, it also may be easily recognized. The only thing with which the latter might be confounded is phlegmonous erysipelas, but if the mild character of the general symptoms in erythema nodosum, the distinctly circumscribed form of the tumors, and the fact that the disease never terminates by suppuration, are recollected, there need be no difficulty in making the diagnosis.

Prognosis.—Erythema is a very mild disorder in a large majority of the cases. The only conditions under which it proves serious are when the intertrigo attacks children laboring under chronic entero-colitis, or those affected with severe thrush connected with gastro-intestinal inflammation, when it cannot fail to increase the sufferings and danger of the patient; or, when it implicates, as I have seen it do in two instances, extensive portions of the cutaneous surface, involving the folds of the neck, armpits, groins, and genital organs, and this, too, without any other signs of disorder of the digestive apparatus than those showing functional derangement. In one of these cases, the extent and depth of the ulcerations were so great, and the resulting sufferings and constitutional distress so severe, as to have very nearly destroyed the life of the infant, who was but two months old at the time of the attack.

Erythema nodosum would almost certainly excite some uneasiness in the mind of a practitioner unacquainted with its real nature and probable course, and not only so, but it would prove tedious and difficult of cure, unless treated in the proper way. When managed correctly, however, it almost always gets well without any difficulty.

TREATMENT.—Erythema fugax requires no special treatment. The disorder which has occasioned it is the point to which our attention must be turned, and not the eruption, which is a mere consequence.

Ordinary, mild cases of intertrigo require no other measures than attention to strict cleanliness. The irritated parts must be carefully washed two or three times a day, and if the nates, genital parts, and thighs are concerned, the washing must be repeated after each evacuation of urine or stool. After this the parts should be dusted with fine starch, with the powder of chalk or lycopodium, or with calomel, which, in my hands, has answered best of all, or else well anointed with some mild ointment, the best of which is in my opinion Goulard's cerate. The washing ought to be performed with a fine soft sponge and warm water. The sponge is far better than the cloth generally employed, because, with the former, the cleansing can be effected by pressure, whilst with the latter it is necessary to use a kind of wiping or rubbing process, which cannot fail to irritate the inflamed and tender surfaces.

When the surfaces have become excoriated or ulcerated, attention to cleanliness is as important as ever. The application of the drying powders generally employed by the public becomes, under these circumstances, insufficient, and often rather injurious, except, indeed, in cases in which the excoriation is very slight; here the lycopodium powder, or very fine starch or magnesia, will sometimes answer a good purpose. When the excoriation is severe and when ulceration is present, I have never obtained any good effects from powdering; on the contrary, it has often proved injurious, and is at least troublesome and annoying, from the incrusting of the powder about the ulcer. I prefer, therefore, very greatly, when ulceration is present, to dress the part with simple cerate, Goulard's cerate, Turner's cerate, or with ointment of oxide of zinc. The ointment should be applied on a fine rag greased on one side, the rag being doubled and interposed in such a way between the opposite surfaces of inflammation, as to be accurately applied to the whole extent of the disease, and thus prevent all friction or even contact of the opposite sides. These compresses ought to be changed three or four times a day, and all the discharges gently but carefully washed off by *pressure* with the sponge between each change of dressing.

Whilst this topical treatment is being carried out, constant attention must be paid to the state of the digestive function. It is scarcely necessary to apply this remark to cases occurring in the course of thrush or entero-colitis, but there is another class of cases that I have met with in which, though the intertrigo is severe and obstinate, lasting as much as two, three, or four weeks, the signs of gastro-intestinal disorder are so slight as to pass unnoticed unless carefully inquired into. Thus they may consist merely in the fact that the child has a few more stools per day than usual, or that the stools are more liquid than they should be, or that they exhibit marks of derangement of the digestive process by the appearance in them of imperfectly digested curd of milk, or by their green color and sour smell. Whatever be the character of the derangement of this function, as shown by the general appearance of the child, its appetite, degree of thirst, or the appearances presented by the stools, we should always endeavor to rectify the disorder, and if the attempt prove successful, we shall often see the intertrigo vanish at once, while before it had resisted all the means employed for its cure.

Erythema nodosum occurs generally, as already stated, in feeble children, and is usually accompanied with constipation or unhealthy stools, and slight febrile reaction. The proper treatment is a laxative at the beginning of the attack, and again in the course of the disorder if necessary; rest in bed or on a sofa, which is very important; and, after the operation of the laxative, the administration of tonics, and the use of a light but strengthening diet. The best tonic as a general rule is quinine. If this is not liked, or if there be anything in the case to contraindicate its employment, we may substitute the compound tincture of bark, in the dose of fifteen or twenty drops, three times a day. If the child is pale and anemical, iron is the proper remedy. It should be given in connection with the tincture of bark, or with small doses of brandy, when the appetite is poor, and the strength and spirits of the child much below their natural level.

Topical remedies are not necessary as a general rule. When, however, the local symptoms are severe, or there is much heat or pain in the tumors, they should be kept covered with compresses moistened with some kind of mucilage, or with lead-water and laudanum.

ARTICLE II.

ERYSIPELAS.

Definition; Forms; Frequency.—Erysipelas is a non-contagious exantheme, characterized by a deep red rash, attended with heat and swelling of the skin, sometimes with inflammation of the subjacent cellular tissue, and terminating generally in resolution, but sometimes in suppuration or gangrene. The disease is very variable as to its extent, and has the peculiarity of spreading from place to place, the part first attacked recovering, whilst the neighboring surface is becoming affected.

The disease, as it occurs in children over six months of age, presents the same characters as in adults, and requires therefore no particular attention in this work. In younger children, on the contrary, and especially in the new-born infant, it is different in several particulars from that of older children or adults, and this I shall attempt to describe. The form which occurs in new-born infants, has been technically named erysipelas neonatorum.

Erysipelas is a rare disease in private practice, particularly amongst families in easy circumstances. In lying-in and foundling hospitals, on the contrary, it is of frequent occurrence, and it is not uncommon in hospitals for children and in the children of the poor. I have myself met with but three cases of erysipelas in children under six months of age, whilst I have met six in older children.

Causes.—The erysipelas of young children almost always starts from some previously existing cutaneous inflammation, the most frequent seats of which are the umbilicus during the process of separation of the cord, the irritated folds of the skin existing in erythema intertrigo, the inflammation accompanying the vaccine disease, and that which exists in the eczematous and impetiginous eruptions of the scalp, ears, and face. In a large majority of the cases observed in new-born children, the disease begins upon the abdomen, and generally at the umbilicus. In those which occur in children at the breast, it may show itself at any of the points above mentioned.

But, though erysipelas commonly starts from, and may at first view seem to be produced by these different local irritations, it is impossible to suppose that they can be anything more than the exciting agencies or causes, which bring into action a disease of which the seeds already exist in the economy. We must, therefore, in order to understand the real mode of causation of erysipelas, seek for the conditions that give rise to this predisposition to the malady, without which the above-mentioned exciting causes rest without effect. These conditions are either a general epidemic constitution of the air, affecting certain districts of country, and acting more or less upon all classes of the community, but with especial force upon the destitute and miserable; or else a local epidemic constitution, such as that often occasioned by the unfavorable hygienic conditions of hospitals, and particularly of lying-in and foundling hospitals, or that not unfrequently determined by the same causes in the crowded and miserable habitations of the poorer classes of the inhabitants of large towns and cities.

SYMPTOMS.—Infantile erysipelas is not generally preceded by any constitutional symptoms. The appearance of the eruption is usually the first sign of the disease. As soon, however, as the eruption appears, or very soon after, the child is attacked with fever, marked by frequent pulse, heat and dryness of the skin, restlessness and insomnia, and thirst. In the form of the disease which occurs in very young infants and in hospitals, or amongst the lower classes of the population, the eruption almost always begins upon the abdomen, and very generally at the umbilicus, whence it extends to the rest of the trunk, to the genital parts, and sometimes to the inferior extremities. Even under the circumstances just mentioned, however, the eruption sometimes commences upon the face or upon the limbs. In children over two weeks of age, and in those observed in private practice, the disease may begin upon any part of the surface. It very often commences in the neighborhood of a vaccine pock, in a patch of erythema intertrigo, whether this be seated on the neck or about the pelvis, or it may appear first upon the face, or upon one of the extremities, without any apparent exciting cause, and extend thence with greater or less rapidity to other parts of the body.

The form of the disease which occurs in very young infants, and which is by far more frequent in lying-in and foundling hospitals than under any other circumstances, begins almost always, at least when of a severe type, on the abdomen. It attacks hearty as well as more delicate children, and is generally very rapid in its progress. The erysipelatous surface is at first of a bright red and shining appearance, but soon assumes a purplish hue, and as this occurs, becomes exceedingly hard to the touch, and somewhat, though not very much swelled. As the case goes on, unless resolution, which is a rare event, should take place, or death occur at an early period, the purple color deepens into livid, vesications occur, the cellular tissue is destroyed, and in many instances extensive gangrene takes place, so that the scrotum has been seen to "become black and slough away, leaving the testicles bare, and hanging loose by the cords." (*Maunsell and Evanson.*) In this form of infantile erysipelas, examination after death almost always discloses severe and extensive peritoneal inflammation, a condition which cannnot fail, of course, to add greatly to the danger of the disease.

But infantile erysipelas does not always exhibit these violent characters, though whenever it occurs in infants under a year old it must be regarded as a very dangerous affection. When it attacks children over two weeks or a month old, it usually starts, as has been stated, from the neighborhood of a vaccine pock, from the inflamed surfaces of intertrigo or those of eczematous or impetiginous eruptions, or it begins without evident cause, as in adults, on the face, or on some part of the extremities. It appears first in the shape of a bright red inflammation of the skin. After a short time the erysipelatous surface becomes tense, shining, very hot, slightly swelled, and painful to the touch. Pressure causes the color to disappear, but this rapidly returns when the pressure is removed. Coincidently with the appearance of the cutaneous redness the child is seized with fever, restlessness, and severe thirst. From the spot first attacked the disease extends rapidly to the neighboring surfaces, from the neck and arms to the head and trunk, and from the groins or genital parts to the rest of the trunk and to the inferior extremities. When it begins upon the face, it extends to the scalp, and may thence travel over the whole surface, or it may remain limited, as it so often does in adults, to the head alone. In one case that I saw, in an infant three weeks old, in which it began upon the face, it extended gradually over the whole cutaneous surface, and yet the child recovered. In another, two months old, it began upon the bridge of the nose, and from thence extended over the whole head, but did not reach the trunk or limbs. In a third case a vaccinated arm was attacked with erysipelas on the eighth day of the vaccination. The disease extended down to the fingers, and upwards to the shoulder. From the shoulder it spread gradually over the whole trunk, and down the whole length of both lower extremities. As it was subsiding on the feet, it appeared on the arm opposite the one first attacked, and then attacked the corresponding side of the head, where it ceased. The child finally recovered after an illness of three weeks.

As the peculiar inflammation spreads to the neighboring surfaces, the parts first attacked lose their red color and swelling, and undergo a process of desquamation. In some instances, the inflammation has caused suppuration of the subcutaneous cellular tissue, so that even when the greater part of the surface first attacked has ceased to present the peculiar characters of the erysipelatous inflammation, there remains behind abscesses of greater or less extent. Thus, in one of the cases that came under my own notice, when the erysipelas had left the head and thorax, and was confined to the pelvis and inferior extremities, there were two abscesses on the scalp, and one over the right pectoral muscle, whilst all the skin between the abscesses had regained its natural appearance, with the exception of the desquamative process, which was going on as usual. In another, but rarer set of cases, the inflammation sometimes returns to the parts over which it has already passed.

The swelling which accompanies this disease, is usually of an œdematous nature,—the œdema being most marked in the hands and feet, and upon the face, whilst upon the trunk it is much less considerable.

The general symptoms consist at first, as already stated, of those indicating a strong febrile reaction. If the case goes on favorably these symptoms continue until the disorder terminates. But when the disease is severe, and especially when it ends in vesication, in extensive destruction of the cellular tissue, or in gangrene, the general symptoms are much more violent, marking thereby the gravity of the attack. The face and lips become pale, and the tongue and mouth dry. The child is in a state of constant agitation at first, and expresses its uneasiness and suffering by incessant moaning or crying, but after a time it becomes heavy and drowsy from exhaustion. The pulse is very frequent and feeble; diarrhœa and vomiting make their appearance, and the child dies at last in a state of profound debility; or convulsions occur towards the last, and terminate the case as they so often do in the diseases of infancy and childhood.

The *duration* of erysipelas in children is extremely uncertain, and depends very much upon its form. In that which occurs in the new-born child, or within one or two weeks after birth, it sometimes proves fatal within seven days according to Canstatt (*Handbuch der Med. Klinik*, 2d ed. vol. ii, p. 264). M. Bouchut (*Mal. des Enf. Nouv.-Nés*, p. 532) gives as an approximation to the ordinary duration of infantile erysipelas, between four and five weeks, and states that this is also the result arrived at by M. Trousseau. In one of the cases alluded to by myself, in which the disease extended over the whole cutaneous surface, the duration was four, while in another it was three weeks; in the one in which the eruption was limited to the head, the duration was a week. In the six remaining cases, the disease was limited to the nose and eyelids, or the face and scalp, and lasted from three to nine days.

Diagnosis.—The diagnosis is very easy. The peculiar shade of the red color, the presence of decided though moderate tumefaction of the affected part, the severity of the general symptoms, and the characteristic erratic mode of extension from surface to surface, all assist to render the diagnosis very clear to those who have a proper amount of medical knowledge.

Prognosis.—Erysipelas is always a dangerous disease in young children. The precise degree of danger in individual cases will depend chiefly on two circumstances: first, the age of the subject; and second, the hygienic conditions under which the disease occurs. It is exceedingly dangerous in new-born infants, so much so indeed that M. Bouchut declares that they all die (*Loc. cit.* p. 532). This is in all probability almost strictly true of the cases which occur in infants only a few days old, particularly when they take place in lying-in hospitals, or even in private practice, during the prevalence of an epidemic of puerperal fever. The disease is always very dangerous in hospitals, even in infants over two weeks old. Yet it would appear not to be so grave as represented by M. Bouchut, who thinks that very few indeed have been cured even at that age; for, of thirty cases in infants between one day and a year old observed by Billard at the Foundling's Hospital of Paris, sixteen, or only one more than half, proved fatal. Schwebel reports 54 deaths in 86 cases (*Meissner, Kinderkrankheiten*, 3d ed. vol. i, p. 372).

In private practice, erysipelas as it occurs in children between two weeks and a few years old, is a dangerous malady, but yet is far from being so in the same degree as in the new-born infant, and in hospitals. I have already stated that I have seen three cases in young infants; one three weeks old, in whom the disease lasted four weeks, and travelled over the whole cutaneous surface; another ten weeks old, and in whom also it travelled over the greater part of the cutaneous surface; and a third two months old, in whom it remained limited to the head. All of these recovered. Again, I have seen six cases of erysipelas of the face or head in children between eight months and twelve years old, and these also ended favorably. It must be recollected, however, to account for these recoveries, that they all occurred in hearty children, and under the most favorable hygienic conditions met with in private practice. To conclude, MM. Rilliet and Barthez report nine cases of erysipelas of the face in children, all of whom, with three exceptions, were over five years of age. Five of the nine cases were idiopathic; in four the disease complicated other affections. All of the spontaneous and one of the complicated cases recovered. The two others, both of which occurred in subjects laboring under measles attended with pneumonia, proved fatal.

TREATMENT.—The treatment of erysipelas in new-born infants, especially when the subjects of the disease are the inmates of a hospital, and when it occurs coincidently with a puerperal fever-epidemic, is, as may be learned from the almost certain fatality of the disorder, exceedingly hopeless. M. Trousseau (*Barrier, Traité Prat. des Mal. de l'Enfance*, t. ii, p. 560) has made trial unsuccessfully of emollients in every form, of fomentations, lotions, baths, and of ointments containing sulphate of iron. "I have tried," he says, "surrounding the whole body and limbs, with blisters in the form of strips; the erysipelas has passed over the obstacle. I have applied without success blisters upon the surfaces already invaded by the inflammation. I have obtained no advantage from mercurial ointment or from baths containing corrosive sublimate." He even tried the application of the actual cautery in points where the disease was beginning, but without effect. So, too, with methodical compression.

Underwood says, that "upon the complaint being first noticed in the British Lying-in Hospital, various means were made use of without success: the progress of the inflammation has seemed, indeed, to be checked for a while by saturnine fomentations and poultices, applied on the very first appearance of the inflammation; but it soon spread, and a gangrene presently came on; or where matter has been formed, the tender infant has sunk under the discharge." He adds that he then proposed bark, to which, sometimes, a little confectio aromatica was added, and that from that period several cases recovered. After this, linen compresses, wrung out of camphorated spirit, were applied in the place of the saturnine solution, and proved successful in several instances in checking the inflammation. "Nevertheless, the greater number of infants attacked with this disorder sink under its violence, and many of them in a very few days." (*Treat. on the Dis. of Children, Am. ed. by Dr. Bell, from the 9th Eng. ed.* p. 103.) In a note to the above Dr. M. Hall states that fomentations of extract of poppies diffused in warm water, and poultices consisting of the same fluid and crumbs of bread, proved beneficial in many instances. Dewees recommends the application of a blister, when the erysipelas is so situated as to allow the whole surface of inflammation and a portion of the neighboring healthy surface to be covered by the plaster. When this cannot be done, he prefers the use of the strong mercurial ointment, which must be applied over the whole of the eruption, and partly upon the healthy skin, and renewed as often as the part becomes dry.

It is very difficult amidst the variety of advice given by different writers, and especially when we reflect upon the great mortality of the disease under every kind of treatment, to determine which to select. For my own part, I should prefer the use of cooling emollient applications during the first part of the attack, whilst the skin is of a bright red color, hot, and shining. When the circulation becomes languid, and the color of the eruption is disposed to deepen from red to purple, I should suspend the use of the emollient application, and employ instead the lotion of camphorated spirit recommended by Underwood, the camphorated tincture of soap, which I have known to be of great service in the erysipelatous inflammations occurring in patients of broken-down constitution in the hospital of this city, and which is to be applied three or four times a day by means of a soft sponge; or lastly, I would make trial of Kentish's ointment, a remedy found of great service by my father, Dr. Charles D. Meigs, in the erysipelas of children. (*North Am. Med. and Surg. Journ.* vol. vi, p. 77.) This ointment he prepares by rendering basilicon ointment soft (not fluid) with spirits of turpentine. It is rubbed upon the inflamed part with the fingers, the anointing being "repeated often enough to keep the part always very thinly covered." The internal treatment should consist in attention to the state of the bowels, which are to be kept soluble by the mildest laxatives, without being purged, and in a resort to tonic and stimulating remedies upon the very first approach of symptoms indicating exhaustion. The best remedies of this class are proper diet, wine whey, small quantities of brandy, and bark in connection with minute doses of carbonate of ammonia.

When the inflammation has gone on to the production of subcutaneous suppuration, it becomes still more important to sustain the forces of the constitution, by giving the infant a healthy and abundant breast of milk, and by the internal use of brandy in small quantities, of bark, or better still, of quinine, in combination with small doses of carbonate of ammonia. At the same time the suppurating surfaces must be well fomented, and dressed with warm poultices, and when necessary, laid open by careful incisions, observing the precaution to cause as small a loss of blood as possible. If the case occur in a hospital, or in a child placed in unfavorable hygienic conditions, let the following statement of M. Barrier be borne in mind. "However much the life of an infant be threatened by erysipelas, if we can but persuade a wet-nurse to take charge of it, the pure air of the country is often seen to replace most advantageously all other therapeutical resources." (*Loc. cit.* t. ii, p. 562.)

As the preceding remarks have been restricted to the form of the disease which occurs in infants under two weeks of age, I have now to make some observations on the cases which occur in older children.

The disease is still, even at this latter age, a very dangerous one, though much less so, certainly, than in the new-born child. When the subject of the attack is a hearty one, we are advised by some to draw blood, either by venesection or leeching. I should certainly be very chary of following this plan in a child under six months, and were I to resort to it at all, it would be only in a very robust and sanguine constitution, and, moreover, in a child placed in the most favorable hygienic conditions. In fact, in my own cases, I have never made use of depletion in any form, and have never seen any reason to regret my avoidance of it. I have been deterred from so doing by two reasons,—the fear of exhaustion, which is so apt to occur in the disease, and the apprehension lest the leech-bites or cup-marks, in the case of local depletion, might prove new foci of the erysipelatous inflammation. The only internal remedies necessary in the beginning, are such laxatives as may be required to keep the bowels soluble when they are bound, such as shall correct acidity or diarrhœa when either is present, and those which promote an open state of the skin, and a free discharge of the urinary secretion. For the latter purpose I know none better than the solution of the acetate of ammonia, and the sweet spirits of nitre, about twenty or thirty drops of the former, with five of the latter, in sweetened water, to be repeated every two or three hours. At a later period of the disease, when the child begins to emaciate and grow feeble, its strength must be carefully supported by the use of proper diet, and of stimulants and tonics. The only proper diet is of course breast-milk. The best stimulants are five or ten drops of brandy, five drops of aromatic spirits of hartshorn, or a quarter or sixth of a grain of carbonate of ammonia, in weak syrup of ginger, to be administered four or five times a day, or more frequently, when the forces of the child are greatly prostrated. The proper tonic is from a quarter to half a grain of extract of bark, or half a grain of quinine, in some proper vehicle, every three or four hours.

The best local treatment is, in my opinion, cooling or tepid emollient applications, as slippery elm bark, marsh-mallow, or flaxseed tea, during the first few days, whilst the reaction is marked, and the calorification of the body high. Somewhat later, when the strength begins to be reduced, and the color of the eruption to deepen, we should make use either of mercurial ointment, which is highly recommended by some, or of the Kentish's ointment or camphorated tincture of soap, to which attention has already been called. I would here propose the trial of an ointment, which I have found not only soothing and comforting to the child, but also of manifest curative efficacy, in the violent cutaneous inflammation of scarlatina. It consists of one ounce of fresh cold cream, rubbed up with a drachm of glycerine. It should be smeared over the inflamed surface several times a day, and need not interfere with the use of emollient applications. In scarlatina it has been most useful in reducing the burning heat of the eruption, and in softening the harsh and distended skin, and by these effects has aided greatly in moderating the severity of the general, and especially of the nervous symptoms.

In children over two or three years of age, erysipelas must be treated on the same principles as in adults: by moderate abstractions of blood from the arm, by low diet and rest in bed, by the internal use of laxatives occasionally, of minute doses of tartar emetic or ipecacuanha, either alone, or in neutral mixture, and by the external application of emollient infusions, so long as the symptoms remain acute, and the strength unreduced. But when, after a time, the fever begins to subside, or the child begins to show signs of debility and a tendency towards the typhoid condition, all exhausting measures must be suspended, and we must endeavor to maintain the life-actions in a proper degree of energy, by a more nourishing and abundant diet, by the prudent administration of bark or quinine, and even by the use of brandy and ammonia, should the strength of the patient be disposed to give way suddenly or rapidly. Under these circumstances, moreover, the best local application will be either the Kentish's ointment, or the camphorated tincture of soap.

ARTICLE III.

ROSEOLA.

Definition; Synonymes; Frequency; Forms.—Roseola is a non-contagious, fugacious exantheme, characterized by rose-colored patches, of irregular size and shape, which are unaccompanied by elevations or papules, and the appearance of which is preceded and accompanied by febrile symptoms.

It is often called in this country scarlet rash, and under that title, supposed to constitute a very mild form of scarlatina. It is sometimes called also French measles, and rubeola sine catarrho.

Roseola is of rather *frequent* occurrence amongst children, though more rare than either measles or scarlet fever.

There are three *forms* of the disease met with in children, roseola æstiva, roseola autumnalis, and roseola annulata. As the two former, however, present no differences of any importance, I shall describe them under one head, whilst the latter, quite unlike the other two, requires that I should describe it apart.

CAUSES.—Roseola may occur at all *ages* of infancy and childhood, and at any *season*, but it is most common in summer and autumn. It has been known to prevail as an *epidemic*, but has never been thought *contagious*. It may attack the same individual on several different occasions, one attack not preserving from repetitions. The variolous eruptions are sometimes preceded by roseola, and in some children it makes its appearance on the ninth or tenth day of the vaccine disease. Of the various causes that I have known to produce it, the most frequent is certainly derangement of the digestive function during the first dentition. It is said also to be occasioned by sudden changes of temperature, by violent exercise, and by the use of cold drinks while the body is heated and moist with perspiration.

SYMPTOMS.—Young children who have been suffering for a few days with disorder of the digestive function often exhibit a slight roseolous eruption, lasting twenty-four or thirty-six hours, and then disappearing. The eruption in this mild form of the disease appears suddenly, often in the course of a single night, covering the trunk or even the whole surface with numerous patches, nearly circular in shape, or in irregular, broad, and waving lines, situated close together and yet distinct, and of a light rose color. In another and rather more violent form, occurring especially during dentition, the eruption appears after vomiting, fever, diarrhœa, and slight nervous symptoms, or possibly after slight convulsions, with the characters above mentioned, except that the rash is deeper in color, greater in extent, and that it lasts generally a longer time,—two, three, or four days. Again, in a yet more marked form, the roseola æstiva and autumnalis, the disease is preceded by certain symptoms which it is important to note. It begins with more or less chilliness, alternating with heat, with loss of strength and spirits, with headache, restlessness, sometimes mild delirium, and even, it is said, though I have never seen them, with slight convulsive phenomena. At the same time there is some febrile reaction, marked by accelerated pulse, heat and dryness of the skin, thirst and loss of appetite; the digestive function is shown to be deranged by the presence either of constipation or diarrhœa. After these symptoms have continued for two, three, four, or even six or seven days, the eruption appears first upon the face and neck, whence it extends in twenty-four or forty-eight hours, to the rest of the body. The rash resembles very closely, in some cases exactly, that of measles. It is in the form of irregularly circular and rather large patches, at first of a red, but soon changing to a deep rose color, and separated from each other by portions of healthy skin. The eruption is sometimes accompanied by itching, and sometimes by stinging pain, and the febrile symptoms generally continue, though moderated in degree, after the appearance of the rash; while in other instances, the fever disappears entirely from that moment. The rash lasts between one, and two or three days, as a general rule, and fades away gradually until it has entirely disappeared. In some cases it comes and goes alternately for a week after its first appearance.

ROSEOLA ANNULATA is a curious and interesting form of the disorder, from the singular and beautiful appearance of the bright rose-colored rings which constitute the eruption. I have seen but three examples of this variety, while I have met with a large number of cases of the other forms. It must, however, be of very rare occurrence, since MM. Guersant and Blache state that they have never chanced to meet with it, though they have seen a large number of roseolous eruptions. (*Dict. de Méd.* t. xxvii, p. 626.)

This variety of roseola appears in the form of rosy rings, or circles, whose centres retain the natural color of the skin. The favorite seats of the eruption are the abdomen, loins, buttocks, or thighs, or it may cover the greater part of the body. In one case that I saw, the eruption covered the face, neck, and trunk. In the other it was seated upon the face, trunk, and upper extremities. The rings are at first not more than one or two lines in diameter, but they enlarge gradually until their centres measure as much as half an inch in diameter. In some instances two or three rings surround one another, the skin in the intervals between them still retaining, however, its natural appearance. The disease is, when accompanied by symptoms of reaction, usually of short duration. The cases which occurred to myself lasted only three days, and were accompanied by decided febrile symptoms, together with signs of digestive derangement. It sometimes assumes a chronic form, the eruption fading in color in the morning, and increasing again and causing heat of skin, in the evening.

DIAGNOSIS.—Roseola æstiva might be readily mistaken by a careless observer for measles or scarlatina, and especially for the former. I have no doubt whatever that cases of roseola are often regarded, under the title of scarlet rash, as examples of a very mild form of scarlatina, a misapprehension which will explain some at least of the supposed instances of second attacks of scarlet fever in the same individual. This is a mistake, however, that ought not to occur, and need not, if the following characters of the two diseases are properly understood. The rash in scarlatina is, in the first place, of a much brighter tint, and it is more persistent and more uniformly spread over the surface than in roseola. When we come to analyze the characters of the two eruptions, there are other distinctions between them which assist greatly in making the diagnosis. In scarlatina, the eruption is composed of very large patches, or it is absolutely uniform, and evenly distributed over large surfaces, as over the whole trunk, or over the flexor or extensor aspects of the limbs. It is seen to be composed, too, when minutely examined, of an aggregation of very minute red points, which are dotted so closely together, as to present the appearance of a general scarlet blush. In roseola, on the contrary, the rash is composed of irregularly circular, crescentic, or waving patches, with portions of skin between of a natural or nearly natural color. The patches, moreover, are of different tint from that of scarlatina, being of a deep rose, instead of a bright red or scarlet color, and they cannot, upon close examination, be resolved into the minute dotted points which make up the scarlatinous eruption. When we add to these circumstances the facts, that in roseola there is no faucial inflammation, that the pulse has not the same frequency almost invariably present in very slight cases even of scarlet fever, that all the general symptoms are much less strongly marked, that no desquamation takes place in roseola, and that the duration of the attack is much shorter, I think we have points of difference between the two, quite numerous and marked enough, to render the differential diagnosis easy to a careful observer.

It has always seemed to me impossible to distinguish with certainty between roseola and measles by the eruption alone, and I find that MM. Rilliet and Barthez are also of this opinion. (*Mal. des Enfants*, t. i, p. 732.) We are told by writers that in roseola the patches composing the eruption are more distinct, larger, paler, and more irregular in shape than in measles, and that they are separated by intervals of healthy skin; but I am quite satisfied that in some cases witnessed by myself, these differences are not sufficient to distinguish them. The diagnosis is to be made by attention to the following points: by the absence of catarrhal symptoms in roseola, by the slighter severity of all the general symptoms, and by the much shorter duration and greater irregularity of the initial phenomena, which latter seldom last in roseola more than one or two days, and consist of symptoms of gastro-intestinal derangement, whilst in measles they last three and almost always four full days, and consist of very strongly-marked catarrhal or respiratory symptoms, with very slight signs of gastro-intestinal derangement.

Roseola annulata is so peculiar and characteristic in all its appearances as to prevent its being mistaken for any other disease that I am acquainted with.

PROGNOSIS.—Roseola is probably never dangerous to life. If it ever is so, it must be in consequence of its occurring in connection with some severe internal disease.

TREATMENT.—The only treatment necessary in roseola is attention to diet; the correction by that means, or, if necessary, by a mild laxative, by some antacid preparation, or by a mercurial dose, of the gastric or intestinal disorder; rest in bed, or seclusion in a chamber with a properly-regulated temperature; and the use of mild diaphoretics and of cooling demulcent drinks.

ARTICLE IV.

URTICARIA.

DEFINITION; SYNONYMES; FREQUENCY; FORMS.—Urticaria is a non-contagious exantheme, characterized by hard elevations upon the skin, of uncertain size and shape, and of a reddish or whitish color, or, more frequently, partly red and partly white; the eruption is generally of short duration, is almost always accompanied with intense heat, and violent itching and burning, and is preceded by more or less marked signs of gastro-intestinal disorder.

Its most common title is that of *nettle-rash*. The mild, discrete form of the disease is generally called *hives*, in the nursery. It is sometimes described under the name of *essera*. It is of very *frequent* occurrence amongst children in a mild shape. I have seldom seen in early life the abundant and severe eruption covering the greater part of the surface, which is met with in adults.

The most common *form* of urticaria in adults is well known to be the *urticaria febrilis*, which is an acute disease of short duration. Two other forms of the disease, the *urticaria evanida* and *tuberosa*, are occasionally met with in adults, though they are both rare. In children, by far the most frequent form of the disease that I have seen is one in which there is scarcely any fever whatever, and in which the eruption is moderate; the urticaria febrilis is, however, not at all uncommon in early life, while on the other hand, I have never met with an instance either of urticaria evanida or tuberosa at the age referred to.

CAUSES.—Children possessing a fine and delicate skin, especially when they are at the same time endowed with a highly nervous temperament, are particularly predisposed to attacks of urticaria. The only other causes that I am acquainted with are the functional disorders of the digestive apparatus which occur in the spring and summer seasons, the influence of dentition, derangement of the gastric functions from the use of improper food, and lastly, the ingestion of certain articles of diet, which have been proven by long experience to be apt to occasion attacks of the disease. Of the articles last referred to, those which most frequently produce this effect are crabs, the eggs of certain kinds of fish, certain crayfish, and some kinds of smoked, dried, or salted fish.

Some children are exceedingly liable to the appearance upon different parts of the body of a few patches of urticaria. Very slight disturbances of the gastric function, a very warm day, and excessive clothing, will occasion in such subjects an attack of the disorder; whilst in many others again, the disease is never seen under any circumstances, or only at rare and long intervals.

SYMPTOMS.—The form of the disorder most commonly met with in children, in which there is neither fever nor other marked signs of disorder of the general health, is the disease generally described under the title of *lichen urticatus*, but which ought, it seems to me, to be considered as one of the varieties of urticaria. This eruption consists of large inflamed papules, which are irregular in shape, being either rounded or oblong, projecting most in the centre, and which appear suddenly, without any or only slight prodromic symptoms. The papules are of a bright red color, excepting in their projecting central portions, where they are whitish or of a very pale red tint. The eruption is accompanied with a smarting and burning pain, and with the most violent and annoying itching, which the child endeavors to allay by frequent and often rude scratching. It is very fugacious in its character, appearing suddenly, lasting for a few hours or several days, and then disappearing entirely, or recurring again after a short time in the same or in new places. It terminates finally, after from a few days to several weeks, by resolution or by a slight furfuraceous desquamation. The most common seats of the eruption in children are the face, about the buttocks, or upon the thighs, or upper part of the arms.

This is the form of the disease I have met with in infants, and in children under two and three years of age. It is, as already stated, of very slight consequence, being merely annoying and never dangerous. In young infants it occasions sometimes much crying and irritability, which can be explained only by the discovery of the eruption.

The *urticaria febrilis* is usually, but not always, preceded for a few hours or two or three days, by feverishness, and by more or less marked signs of gastric disorder, such as nausea, chilliness, headache, and languor. In other instances the fever and the rash occur at the same time. The eruption begins with a sense of itching, and with heat and burning of the skin, and soon after there appear on the shoulders, loins, inside of the arms, and about the thighs and knees, reddish and solid elevations, irregular in outline, but generally roundish or oblong. The latter shape is the one the elevations most frequently assume, and it is from the resemblance which they bear in this form to the marks left by the stripes from a rod or whip-lash, that they are often called weals. The elevations project a good deal above the surrounding surface, forming knots or ridges; their size is variable; they have hardened edges; they are reddish in color, except over the central and most projecting part, which is generally, and always when the swelling is considerable, whitish in its tint; and they are surrounded by a narrow areola of a bright red or scarlet color. The amount of the eruption is very uncertain, the elevations being sometimes separated by considerable intervals of healthy skin, while in severe cases, they are extremely numerous, and from their confluent character in such attacks, give to the part upon which they are seated, a nearly uniform red color, and occasion at the same time a very decided puffing and swelling of the skin.

The eruption, when at all considerable in degree, is attended with violent itching and burning. The former is often so severe and troublesome as to occasion the most distressing irritation to the patient, precluding all comfort or quiet. It is increased by heat, and especially by that of the bed. The patches of eruption which appear first do not continue throughout the disease, but, after lasting from a few minutes to a few hours, fade away, and are replaced by new and successive crops. During the attack the patient is usually more or less feverish, and he suffers from languor, loss of appetite, furred tongue, and the usual signs of gastric derangement. The symptoms subside gradually, so that after a period varying from two or three days to a week, the disorder has entirely disappeared, leaving behind no traces, except in a few instances a slight desquamation.

When this form of urticaria follows the ingestion of certain articles of food, the eruption usually appears within a very few hours after the meal, being preceded and accompanied by nausea or vomiting, pain and distress in the epigastric region, giddiness, headache, and feverishness.

Diagnosis.—There can be no difficulty in recognizing a case of urticaria. The peculiar characters of the eruption, and especially the size, shape, and color of the solid elevations of which the patches consist, the violent itching and burning which accompany it, and its fugacious character, render it unlike any other cutaneous disease, and ought to prevent any mistake as to its nature.

Prognosis.—Urticaria is probably never dangerous in children. If it be accompanied by symptoms of a threatening or alarming character, these are dependent rather upon the gastric disorder, which is the cause of the urticaria, than upon the latter affection itself. I have never known it to be more than troublesome and annoying.

Treatment.—There are but two really important indications for the treatment of this disease: to attend to the state of the digestive function, and to allay, by proper means, the distressing irritation occasioned by the itching and burning of the eruption.

In the mild form of urticaria, called in the nursery "hives," and in scientific language, lichen urticatus, the only treatment necessary is careful regulation of the diet, and the use of means proper to correct any evident derangement of the digestive function. The food should be light and digestible, but at the same time nourishing. Milk, bread, light meats, and the plainest vegetables, form the proper diet for children over three years of age. Under that age, milk preparations, bread, and in those over a year old, light broths, ought to constitute the diet. In a large majority of such cases, no drug whatever ought to be given. The only ones likely ever to be required are occasional mild laxatives or gentle mercurials, when constipation is present, and some of the antacids, as very small quantities of magnesia or carbonate of soda, or lime-water and milk, when the stomach is acid. To allay the itching and consequent restlessness of the child, the patches of eruption should be well and frequently dusted with toasted rye or wheat flour, which are often very successful. Washing the eruption with salt and water, when the cuticle is not broken, is sometimes very soothing, and when the patches are of small extent this may be done without any impropriety. Dr. Watson speaks well of a lotion ("first recommended by Wilkinson") composed of a drachm of carbonate of ammonia, a drachm of acetate of lead, and eight ounces of rose-water.

In the urticaria febrilis the treatment must depend upon the cause of the attack. When it follows upon the eating of some unwholesome food, we must rid the stomach of the offending substance by an emetic, unless nature has already caused its rejection by spontaneous vomiting. When this end has been gained it will be proper to give some kind of cathartic medicine, and the best is castor oil, as the mildest and most certain, in order to insure the discharge of the whole of the aliment which has been causing the mischief; or small doses of blue pill; or hydrargyrum cretâ, with rhubarb, where there is present any signs of hepatic derangement. After this the only treatment necessary will be the use of cooling and demulcent drinks, containing perhaps a little sweets spirits of nitre, rest in bed, or at least seclusion in the house, for a few days, and careful regulation of the diet. The latter ought to be very light during the continuance of the eruption, consisting merely of milk and bread, or of some kind of gruel or plain broth; after the cessation of the disease, it should be augmented only with due care and quite gradually. To allay the itching and burning of the eruption, and the general distress of the child, the best remedy is a warm bath carefully administered. This may be repeated in six or eight hours if necessary, and between whiles the surface should be dusted with rye or wheat flour, as above recommended.

CHAPTER II.

VESICLES.

ARTICLE I.

ECZEMA.

Definition; Synonymes; Frequency; Forms.—Eczema is an eruptive non-contagious disease, characterized by minute, rather flattened, and generally closely-aggregated vesicles, seated upon an inflamed surface, and usually occurring in somewhat extensive patches. The disease terminates by the absorption of the fluid contained in the vesicles; or the vesicles open and discharge an abundant serous fluid, which forms thin crusts upon the red and inflamed surface, until, after a time, the suppurative process ceases, and the eruption disappears with a slight desquamation.

In children, this disease, in common with impetigo, is often called tooth-rash, milky crust, and scald head.

It is of rather frequent occurrence upon the scalp and face, though much less so, according to my experience, than impetigo.

I shall describe the disease under four heads: *eczema simplex*, *eczema of the face*, *eczema of the scalp*, and *eczema chronicum*. Eczema of the face and scalp often present many of the features of eczema impetiginodes.

Causes.—The causes of this disease are, to say the least, very obscure in most cases. The only conditions which seem to be clearly ascertained as causes, are certain states of constitutional disturbance, such as those which occur at the change of the seasons; disorders of the digestive organs; dentition; improper diet in infants and children; and the application of irritants of any kind to the skin. The causes, it may be added, of eczema are much the same as those of impetigo, and to the article on that disease the reader is referred for more extended information on this point.

Symptoms.—Eczema simplex may appear upon any part of the cutaneous surface, but is most frequently met with in children upon the face, and upon the arms. The eruption appears without any precursory symptoms, and consists of very numerous, closely aggregated, exceedingly minute vesicles, containing a transparent limpid serum. After a short time the contained fluid becomes turbid, and then milky, and is either absorbed, whilst the vesicles shrivel up and disappear by a slight desquamation, or else the fluid escapes by the rupture of the vesicles, and little thin scales follow, which are detached before long from the surface beneath. The eruption is attended with more or less itching and smarting, but does not generally give rise to constitutional symptoms. The vesicles are generally renewed by successive crops, and the whole duration of the affection is usually from two to three weeks, though it may be much longer.

Eczema of the Face is quite a frequent affection in young children, and may exist either in connection with eczema of the scalp, or it may begin upon and remain confined to the face.

It begins with minute vesicles upon the cheeks or forehead, to which parts it may remain limited, or it may extend to the whole face. As the eruption appears the skin becomes reddened, and usually rather tense and swelled. In a short time the vesicles break and discharge a thin, serous fluid, which soon dries into delicate scales. These scales either drop off, leaving an inflamed and shining surface beneath, or they remain attached, and new effusions of fluid taking place beneath, the crusts are increased very much in size and thickness. The eruption may present, therefore, various aspects. The skin may appear either inflamed, tense, and excoriated and humid, or it may seem to be covered with a very delicate, shining epidermis, which is perfectly dry, or presents tiny drops of serum or minute cracks; or, lastly, it may be covered with thick, lamellated crusts of a yellowish or grayish color, formed by the gradual exudation and drying of the discharges beneath the scales first formed. When these crusts are detached in the natural course of the disease, or by remedial means, the surface beneath is found to be red, inflamed, and discharging. The eruption is attended with severe itching and smarting, and occasions often much distress and discomfort to the child, breaking its rest at night, and rendering it cross and irritable through the day.

When the eruption is on the decline, the serous oozing becomes gradually less and less, the inflammation of the derm diminishes, the crusts fall off, and are not renewed, and the disease disappears, leaving often for some time afterwards a slight redness and scurfiness of the skin. It rarely, however, leaves any permanent trace, the part upon which it had been seated presenting, after a time, as healthy and as natural an appearance as the surrounding surfaces.

Eczema Capitis.—Eczema of the scalp is often met with in infants at the breast during the first dentition, and at later periods of childhood, in those who are scrofulous, or who are placed in hygienic conditions unfavorable to health. The eruption may be confined to a small portion of the scalp, or it may cover the head, and extend to the face and neck. It consists at first of disseminated minute vesicles, which break and form thin, lamellated crusts, of a yellowish or brownish color. As the disease advances the scalp becomes very much inflamed. It is red, tense, swelled, and painful. The vesicles increase in number, and discharge an abundant serosity, which hardens into thick yellowish crusts, emitting an offensive oder, covering the inflamed surfaces, and matting the hairs together. The disease is attended with violent itching, which is increased by the exposure of the head to the air, and which causes the child to scratch with such force as to occasion an escape of blood from the irritated and excoriated surfaces.

In some cases, and especially in neglected ones, the disease assumes a chronic form. The tissues of the scalp become thickened, and its lymphatic glands enlarged; abscesses sometimes form beneath the skin; the amount of the secretion diminishes; and the painful irritation and itching are less troublesome. Under these circumstances the crusts are less thick and massive; they become lighter, thinner, and are more easily detached. In such cases the inflammation and suppuration sometimes extend to the hair-follicles, and by destroying them, occasion partial loss of the hair.

I wish to call the attention of the reader to some facts connected with the history of the eczema of children, which are set forth by Dr. Wilson in his admirable work on diseases of the skin. I refer to the circumstance that the vesicular character of this disease so often runs into the pustular form of eruption, so that we have upon the same patient the vesicle of eczema combined with the pustule of impetigo. Indeed, according to Dr. Wilson, this happens almost always when the cutaneous inflammation is violent. Under these circumstances we have the eruption which has been frequently described by former writers under the title of eczema impetiginodes. At page 172 of the fourth American, from the fourth English edition, may be found the following passage: "The eruption usually commences as a patch or blotch of slightly raised pimples; the patch is itchy, is rubbed, increases in size, becomes more inflamed, the cuticle is raised in more or less defined vesicles, which are usually broken by friction, the surface becomes excoriated, somewhat swollen, and pours out an ichorous secretion, varying from a mere oozing to an excess that wets through everything that is applied to it. With the increase of irritation, consequent on the excessive secretion and the congestion which gives rise to it, the patch spreads; where the eruption commenced by several blotches, they probably run into one; the ichorous discharge also increases the local disease by irritating the parts over which it flows. The case up to this time is one of inflammatory eczema, or *eczema rubrum.* The state of *eczema simplex* has hardly existed, and is only to be seen occasionally; but the disease still runs on, its violence increases, and the morbid secretion, from being a transparent and colorless ichor, like water in appearance, becomes slightly opaque (tinea mucosa), milky, then yellowish and semi-purulent, and the case is transformed into *eczema impetiginodes;* or the discharge may take on a still more decidedly purulent character, while small pustules are developed on the red and tumefied skin around the patch, and then the case is one of *impetigo.* Thus the plus or minus of these pathological conditions, irrespective of the cause or essential nature of the disease; in other words, the disease being the same, it may, according to the temperament or constitution of the child, be an erythema verging upon eczema; an eczema rubrum; an eczema verging on impetigo, or eczema impetiginodes; or, the pustular element being in excess, it may be an impetigo. Again, as I have before said, whatever the predominating character may be, whether erythema, lichen, eczema, or impetigo, there will always be present, in a greater or less degree, some, or the whole of the other forms sprinkled over the body; a simple erythema here, an erythema with strophulus or lichen there, a few scattered vesicles of eczema in a third place; or a few congregated psydracious pustules of impetigo in a fourth." In the above passage the characters of eczema in children are described in so graphic and practical a manner, that I am sure the reader cannot but be pleased to read them. I strongly advise all who wish to understand the nature of cutaneous diseases to study with care the original work. It is so full, so clear, and the style is so good, that I particularly desire to record my feeble meed of praise for its merits.

ECZEMA CHRONICUM.—Eczema often becomes chronic in the child as in the adult. The skin, in this form, is either very much inflamed and thickened, presenting excoriations with deep cracks and fissures, which pour out an abundant ichorous secretion; or, the inflammation is less severe, there being much less heat and redness, fewer excoriations and cracks, and a smaller amount of effusion. In the latter condition the eruptive surface is comparatively dry, and instead of a raw and discharging surface, the inflamed part is covered with thin, yellowish, lamellated scabs, or with very fine, minute, whitish scales, which are easily rubbed off, and which, in either case, are evidently produced by the concretion of the thin, watery secretion, escaping from the part.

This form is most common about the neck and upper part of the trunk, and in the flexures of the joints. It usually lasts for months, and is difficult of cure. It is attended with severe itching, which is sometimes so troublesome as to occasion the most distressing and uncontrollable restlessness at night.

I have met with a number of cases of this kind, and have found them very difficult of management. The length of the attack has usually been several months.

DIAGNOSIS.—Eczema simplex, when seated on the hands and between the fingers, may be mistaken for scabies. The distinction can be made, however, by attention to the following points: The vesicles of eczema are flattened, those of scabies are acuminated; in eczema they are also agglomerated together, in scabies they are isolated, and entirely distinct; in scabies the vesicles present little red lines running off from their margins, and marking the course taken by the acarus; and lastly, in that disease, careful search will almost always enable us to detect the insect, which is the characteristic and infallible mark of the disease.

From sudamina, with which eczema might perhaps be confounded, the latter disease may be distinguished by the facts that the vesicles constituting sudamina are much larger, that they are discrete and scattered, that they are associated nearly always with profuse perspirations, and that they are unaccompanied by an inflammatory state of the skin, or by itching.

Eczema of the scalp may be readily mistaken, in severe cases, for impetigo of that part, unless care be observed. If, however, careful search be made for the elementary lesion in a case, the diagnosis can be made with great certainty. This should be sought for on the margins of the eruptive surface. In eczema it will of course be a very minute, transparent, and flattened vesicle. In impetigo it will be a yellowish, prominent pustule. Moreover, even when the elementary lesion cannot be readily detected, the appearance of the crusts will usually suffice for the distinction. Those of eczema are never so thick, nor are they so unequal, irregular, and broken in appearance, as in impetigo. Lastly, in eczema there is a much more abundant secretion of serum, which may be seen oozing from the inflamed surfaces, or from their margins.

Eczema chronicum is often somewhat difficult of diagnosis. The eruption looks rather like a uniform cutaneous inflammation, with cracks and breaks in the skin, yielding a thin exudation, than like a true vesicular eruption, or it may resemble lichen. The true nature of the disease may always be made out, however, by a close inspection of the inflamed surface in a good light, or with the aid of a lens. The specific character of the eruption is always most perceptible on the edges of the reddened surface, for it is at these points that the vesicles are most apt to be found in their elementary condition. From lichen it may be distinguished from the fact that the surface, when deprived of its crusts, is smooth and shining in eczema, while in the former affection, it is rough and papular.

Prognosis.—The eczema of children is rarely dangerous to life, though it sometimes occasions much distress to the health by the suffering, irritation, and especially by the loss of sleep, which it entails. It is often difficult of cure, owing to the fact of its dependence on constitutional disturbance, or upon derangement of the digestive system. It ought always to be looked upon as the expression of a general disorder, or of an internal local disease, and as affording, to some extent, a safe mode of evolution of that disease; and, it should not, therefore, be treated by severe topical remedies, since, if suddenly arrested by such means, the disease might fall with all the greater severity upon parts more important to life.

Treatment.—The treatment of eczema must depend on the state of health of the patient at the time, on the extent and activity of the eruption, and on its acute or chronic character.

I have frequently seen small patches of eczema on the cheeks or forehead of young children, which showed but little disposition to extend. Such cases have often been cured with great ease by the application, twice or three times a day, of an ointment composed of one part of the ungt. hydrarg. nitrat., to three or four parts of simple cerate or lard; or, I have told the mother simply to wash the eruptive patches with cool water several times a day, and to anoint them in the evening with ointment of cucumbers.

When the disease is more extensive and attended with much irritation, it is necessary to examine carefully into the state of the digestive function, and if this be in any way disordered, to endeavor to restore it to a more healthful condition. When the child is teething, the gums ought to be examined, and if found swelled and inflamed, they should be lanced as often as may be necessary. The diet must be properly regulated, the food being changed if that which has been previously taken is found not to be well and completely digested. Constipation, if it be present, must be overcome by altering the food, or by the administration of rhubarb, small doses of magnesia, or sulphur. If the stools are whitish, or very offensive, minute doses of calomel, or small quantities of blue pill, ought to be given from time to time, until these conditions are overcome. So, also, when diarrhœa is present, it should be treated by attention to the diet, and by the administration of a weak castor oil emulsion containing small quantities of laudanum, when the stools are feculent, but small, frequent, and attended with griping; when they are thin and watery, greenish, and composed in part of mucus, the following prescription will often prove very useful:

℞.—Tinct. Krameria,	ʒi.
Tinct. Opii,	gtt. vi.
Sodæ Bicarb.,	℈i.
Syrup. Zingib.,	ʒvii.
Aquæ,	℥ii.—M.

A teaspoonful two or three times a day, for children of one or two years old.

In cases of this kind, a few leeches applied in the neighborhood of the eruption, from time to time, and the application of compresses wet with cold water, or with the decoction of marsh-mallow root or flaxseed, or the use of warm bread-and-water poultices, are frequently of the greatest service, reducing the heat and irritation, and arresting the progress of the eruption.

When the inflammatory character of the disease has been modified by these measures, some application of a kind to alter the mode of action of the part ought to be resorted to. Amongst those most frequently useful are the following: the ungt. hydrarg. nitrat., either pure or mixed with from one to three parts of simple cerate; cucumber ointment; the ointment of carbonate or oxide of zinc; weak tar ointment; sulphur ointment; or a solution of nitrate of silver, of from two to five grains to the ounce, to be applied twice or three times a day.

Chronic eczema must be treated according to the state of the patient's health at the time. When the child is weak and debilitated, the diet ought to be nutritious and strengthening, but at the same time light and of easy digestion. If the blood be thin and impoverished, and the appetite weak or capricious, tonic remedies, as tincture of bark, or quinine, with one of the ferruginous preparations, ought to be administered. I have found it advantageous to give these tonics in a mixture containing a certain proportion of compound syrup of sarsaparilla. When the child shows signs of a scrofulous or tubercular constitution, small doses of the cod-liver oil form the most suitable constitutional treatment.

If, on the contrary, the patient laboring under chronic eczema is of full habit, of gross development, and of florid complexion, the diet ought to be so arranged as to lessen the activity of the nutritive processes, and to diminish the richness of the blood. A moderate use of cathartic remedies, as small doses of Rochelle salts, of calomel and rhubarb, of blue pill and extract of taraxacum, or of sulphur, ought to be resorted to; while at the same time, small abstractions of blood from the neighborhood of the eruption, may be properly directed at sufficient intervals of time. When the eruption is very obstinate and of long standing, it is sometimes necessary to make use of remedies which have been ascertained by long experience, to be efficacious in such cases, and which are said, for the want of a better explanation, to modify or revolutionize the constitution. The most important of these are mercury, arsenic, tincture of cantharides, iodine, iodide of potassium, iron, or cod-liver oil. For my own part, I have avoided giving most of these substances, as being too active and severe in their effects to admit of their being wisely given to young children, except under necessity. The only ones that I have employed have been the iodide of iron, and the cod-liver oil. The former I have usually given in the dose of two drops, in a quarter or a sixth of a drachm of compound syrup of sarsaparilla, three times a day, to children of one or two years old: it should be continued for a period of two or three months. The cod-liver oil is another remedy that I have employed successfully, when the child has been in feeble health. My formula for its administration is as follows:

℞.—Ol. Jecoris Aselli,	℥ss.
P. G. Acaciæ,	℥ss.
Sacchari,	ʒi.
Olei Cinnamom.,	gtt. vi.
Aquæ Cinnamom.,	℥iii.—M.

A large teaspoonful to be given three times a day.

A great variety of local remedies have been recommended by different writers. Of those that I have employed, I have found the following the most useful: tar-water applied with a sponge two or three times a day; citrine ointment, either pure or mixed with from two to four parts of simple cerate or lard; a saturated solution of borax in strong acetic acid, used either pure, or diluted to suit the case; and the following ointment:

℞.—Hydrarg. Protiod.,	gr. xii.
Camphoræ,	gr. v.
Axungiæ,	℥i.

To be applied twice a day.

Amongst many applications that have been used with more or less success, I may mention the following: an ointment composed as follows:

℞.—Hydrarg. Chlor. Mit.,	℈i.
Camphoræ,	gr. v.
Glycerinæ,	ʒi.
Ungt. Aquæ Rosæ,	℥i.—M.;

a solution of nitrate of silver, of from two to ten grains to the ounce, applied twice or thrice a day; ointment of carbonate or oxide of zinc; weak solution of corrosive sublimate; sulphate of potash in lotion; and sulphur ointment.

Mr. Erasmus Wilson (*Dis. of the Skin*, Am. reprint, from 4th Lond. edit. p. 177), in his remarks on the treatment of this disease, insists upon the necessity of carrying out his three great principles, as the law of treatment of cutaneous disease. These principles, *elimination*, *restoration of power*, and *alleviation of distress*, are to be put in force, but with a change in their order. "Elimination," he says, "must always go first; but in eczema infantile, I would place alleviation of local distress second, and restoration of power third." For elimination, Mr. Wilson uses calomel or gray powder (hydrargyrum cum cretâ), preferring the former. One grain of calomel rubbed down with one grain of white sugar, or sugar of milk, is the dose for the youngest infant; for a child one year old, a grain and a half; for a child two years old, two grains. This dose is to be modified according to the apparent strength of the child in the first instance, and in accordance with the action of the medicine in the second. After the first dose, the calomel is to be repeated according to circumstances; once a week, twice a week, every other night for a few times; even every night, for two or three nights, if absolutely necessary. "In my own practice," says Mr. Wilson, "I usually find once a week sufficient, and I am guided to the repetition of the dose, by the state of the little patient. If there be any feverishness, fractiousness, irritability of temper, and increase of pruritus, inaction of the bowels, morbid secretion of the bowels, or threatened congestion of the mucous membrane of the air-tubes, then the calomel powder is to be administered at once, without hesitation, and without delay." The next indication is to *alleviate the local distress*, or soothe and heal the eruption, subdue the pruritus, and arrest the morbid discharge. "We can do all this by the benzoated oxide of zinc ointment, rubbed down with spirits of wine in the proportion of a drachm to the ounce. This ointment should be applied abundantly, and gently distributed upon the surface, until every part of the eruption has a complete coating; the ointment should be applied night and morning, and if accidentally rubbed off, or used upon parts exposed to the air and friction, it may be repeated more frequently. When once applied, the ointment should be considered as a permanent dressing to the inflamed skin, and never removed until the skin is healed, unless special conditions arise which render such a process necessary."* To secure the permanent contact with the skin, he recommends that pieces of linen rag, or a small garment of linen, be kept constantly upon the parts, covered with the ointment.

To fulfil the third indication, the *restoration of power*, he recommends arsenic in combination with iron. He prefers Fowler's solution, of which two minims is the dose for an infant from a month to a year old, repeated three times a day, with or directly after meals. His favorite formula is as follows:

℞.—Vini ferri,	
Syrup. Tolutani,	āā ℥ss.
Liq. potass. arsenit.,	♏xxxii.
Aq. anethi,	℥i.—M.

Dose, a drachm, with, or directly after meals, three times a day.

Mr. Wilson says, of the above treatment, "I have never known any evil effects, present or future, result from this treatment, but I never fail to give strict injunctions, that *if the medicine appear to disagree with the child, it should be given less frequently*, say twice, instead of three times a day, *or suspended instantly*, if the child appear ill; moreover, that in the event of such an occurrence, the calomel powder should be immediately resorted to. The period of continuance of the remedies, must be left to the judgment of the medical man; the treatment sometimes occupies three weeks, and sometimes more. And if a recurrence of the eruption should take place, the treatment should be recommenced, and conducted on the same principle and with like precautions."

When the disease is attended with emaciation, and in the chronic stage, he recommends cod-liver oil. This he gives alone, or sometimes in combination with Fowler's solution of arsenic.

ARTICLE II.

HERPES.

Definition; Varieties; Frequency.—Herpes is a non-contagious cutaneous disease, characterized by an eruption of vesicles assembled in groups on inflamed surfaces, of irregular size and shape, which are separated from each other by perfectly healthy portions of skin. The disease is usually acute in its course, seldom lasting more than two or three weeks, but it is not, as a general rule, accompanied by any severe constitutional symptoms. The separate vesicles composing the eruption last about ten days, and then disappear by the absorption of their contents, by the drying up of the contained fluid without rupture of the vesicles, or by the rupture of the vesicles, the escape of the fluid, and the formation of thin, brownish, or yellowish scabs.

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* The benzoated zinc ointment is prepared as follows:

℞.—Adipis præparatæ, ℥vi; gummi benzoini, pulveris, ℥i. Melt with a gentle heat for twenty-four hours, in a close vessel; strain through cloth, and add; Oxydi zinci purificati, ℥i. Mix thoroughly, and express through cloth.

There are several different varieties of herpes, which have been well divided by Mr. Wilson into two groups, the *phlyctenoid* and *circinate.* The phlyctenoid group is characterized by the irregularity of form exhibited by the eruption, and includes the variety called herpes phlyctenodes, and the local forms, called according to their seat, labialis, nasalis, palpebralis, auricularis, præputialis, and pudendalis; whilst the circinate group is characterized by the arrangement of the vesicles in circles, and includes the herpes zoster, circinatus, and iris. Of these different varieties I shall describe, as of importance in children, only the *phlyctenodes, zoster, circinatus,* and *iris.*

HERPES is quite a frequent disease in children, though one rarely of any considerable importance, except in one of its varieties, the circinatus; and this is so from its frequency, and not from any danger attending it.

CAUSES.—The causes of herpes are often obscure and uncertain, and in many cases entirely inappreciable. The disease is most common in persons who possess a delicate and irritable skin. The most frequent and most clearly ascertained cause is some disturbance of the digestive functions, and, when there exists in connection with this condition, irritations or inflammations of the respiratory mucous membrane, it is especially apt to be developed. Herpes phlyctenodes often follows exposure to a hot sun, while herpes labialis is frequently caused by exposure to a cold wind, especially when this occurs immediately after leaving a heated room. The latter variety also frequently accompanies coryza, angina, and stomatitis, and appears often as a critical eruption in the course, and particularly at the termination, of fevers, catarrhs, and visceral inflammations.

The usual exciting causes of the disease are irregularities in diet, exposure of the body while in a heated state to cold and damp, local irritants, and bilious disorders of all kinds.

HERPES PHLYCTENODES.—This variety of herpes, unlike the other forms of the disease, may appear upon any part of the cutaneous surface, and does not assume a determinate shape. It may appear, indeed, upon several parts at the same time. It is usually, however, met with upon the upper parts of the body, and particularly the cheeks, neck, chest, and arms. It is rare to observe it on the lower extremities.

I believe it to be a rare affection amongst the children of families in easy circumstances. The only examples that I have seen have been the result of poisoning by the different kinds of Toxicodendron.

SYMPTOMS.—The eruption appears in the form of vesicles, usually of very small size, looking like mere points, or attaining sometimes the size of a pea, which are seated in groups or clusters on inflamed patches of the skin, varying in size from that of a dollar to that of the palm of the hand. Sensations of heat, smarting, and itching, are often felt in the part where the eruption is about to show itself; and within a day, usually, after these symptoms have been observed, or without them, the disease makes its appearance, exhibiting one or more red and inflamed surfaces, of an irregular or rounded shape, dotted over with projecting, globular vesicles, which are hard, resisting, and, on the first day, transparent, but which become, in the course of a day or two, turbid or lactescent. The red color of the eruptive patch generally extends a short distance beyond the vesicles: the integument between the different patches retains, however, in all cases, its healthy color and character. A sense of smarting and itching accompanies, as well as precedes, the eruption. On the second day of the eruption, the number of vesicles generally increases, and they become full and distended. About the third or fourth day, the vesicles have become very turbid, and they begin to shrink. About the seventh or eighth day, they are usually transformed, by the drying up of their contents, into thin, brownish crusts, which fall off by desquamation about the tenth or twelfth day. There always remains, for a few days after the disappearance of the eruption, some redness of the surface, which subsides little by little.

This variety of herpes is never accompanied by constitutional symptoms of any severity. A very slight febrile reaction, some languor, loss of appetite, and thirst, are the only ones worthy of note.

HERPES LABIALIS.—This is the most frequent of all the varieties of the disease. It is, as its name implies, a disease of the lips. Usually it is seated upon the line of junction of the mucous membrane with the integument; but it may affect either the former or latter alone. Though generally confined strictly to the lips, the eruption, in some instances, extends to the cheeks, chin, or alæ of the nose.

The disease begins generally with redness, heat, smarting, and painful tension of the portion of the lip upon which the eruption is about to appear. After a few hours, or a day, vesicles begin to show themselves upon the inflamed spot, and there is then observed a red, swollen, and shining point, upon which is seated a group of vesicles. The tumefaction and redness commonly extend some distance beyond the vesicles. The latter develop themselves rapidly, until five or six small, rounded vesicles, filled with a transparent fluid, are seen. The vesicles remain solitary, or several may unite together to form one of considerable size. After the complete development of the eruption, the burning pain which existed at first commonly subsides. The contents of the vesicles soon become turbid and lactescent, and are converted, by the third or fourth day, from a serous into a sero-purulent fluid, at which time, also, the accompanying redness and swelling have, in great measure, disappeared. Soon after this, brownish crusts are formed by the drying up of the fluid of the vesicles, and these drop off usually about the seventh or eighth day. A slight redness remains for a short time at the point of eruption, and then disappears entirely.

HERPES ZOSTER.—This variety of herpes is known also by the names of Zona and Shingles. It is of much less frequent occurrence, in this city, in children, than either the herpes labialis or circinatus. I have never as yet seen a case of it in a child, though Rilliet and Barthez state that they met with this form and the herpes labialis more frequently than any other. The peculiarity of the disease consists in the fact that the eruption appears in the form of a half zone, surrounding half the body, whence its name, herpes zoster, the latter word signifying a girdle or belt.

The most frequent seat of zona is the base of the thorax, the disease extending usually, in the form of a cincture, from the mesial line in front to the same point behind. It may, however, be developed either above or below the part just named, and, under these circumstances, is apt to extend towards or down the arm, or towards the thigh and down the leg. Still more rarely, it has been observed upon the neck, face, or scrotum. There is some doubt as to which side it is most disposed to attack. The half zone formed by the eruption is not composed of a continuous line of vesicles, but is made up of distinct patches of eruption, all following the same general direction, but divided from each other by portions of healthy integument. The eruptive patches may be very closely approximated, or they may be separated by considerable spaces of skin untouched by the disease.

The disease is acute in its character, lasting as a general rule, from one to three or four weeks.

Shingles appear first, after some previous smarting and burning in the skin, in the form of irregular patches of a vivid red color, more or less widely separated from each other, and developed, one after the other, until one-half the body is girdled by the eruption. In some instances the disease appears simultaneously at the two extremities of the zone, and is terminated by the gradual formation of successive patches between these two points. Soon after the appearance of the inflamed patches, numerous small, white projections can be seen, by careful examination, upon the red surfaces; these increase rapidly in size, and are soon converted into distinct, transparent vesicles. The vesicles augment in size, and arrive, in the course of three or four days, at their fullest development, when they are about as large as small or large peas, or, in some few instances, much larger. At this stage of the eruption, the red surface upon which each group of vesicles is seated extends a slight distance beyond the patch, thus forming a kind of areola.

After pursuing the course just described during four or five days, each group of vesicles begins to subside. The redness of the inflamed patch diminishes; the vesicles shrink, and become shrivelled; their contents, which were transparent at first, become opaque, and finally they dry up and form small, dark-brown scabs, which fall off about the tenth or twelfth day, leaving behind reddish spots, which disappear little by little.

The constitutional symptoms of herpes zoster consist usually of slight feverishness, languor, and the signs of gastro-intestinal irritation. The local symptoms are pungent and burning pain at the beginning of the eruption, and more or less severe tension, and sometimes acute pain, in the part upon which the disease is seated, which latter lasts, in some instances, throughout the course of the disorder, or even for some considerable time after it has disappeared.

HERPES CIRCINATUS.—This variety of herpes has been called also ring herpes, herpetic ringworm, and vesicular ringworm. In this country it is always called ringworm. It is, according to my experience, much the most common form of the disease after herpes labialis.

The eruption consists, as in all forms of herpes, of small vesicles seated upon an inflamed surface. The typical character of the eruption is the arrangement of the vesicles—which are very small—upon inflamed surfaces disposed in circular rings, whence its name of circinatus.

SYMPTOMS.—The disease begins with a more or less vivid redness of the integument at the point affected. The redness assumes the form of a circular patch, which varies a good deal as to its size, being in some instances small, not larger than a shilling, and in others presenting a diameter of two or three inches. When small, the redness covers the whole of the patch, but is much fainter in the centre than at the circumference; when large, the centre retains the natural color of the skin, and the redness then takes the shape of a banded ring; usually, the ring is exactly circular, but sometimes it assumes an oval shape. Very early after the appearance of the redness, vesicles begin to show themselves, and soon they become numerous and confluent. They are very small and always of a globular shape. The vesicles follow the same course as in other forms of herpes; they are at first transparent, then become turbid, open, and dry into small thin scales, which fall off generally in eight or ten days, leaving beneath a reddened surface, which disappears gradually. In some instances the eruption is very slight, and the vesicles, which are then excessively minute, disappear by the absorption of their contents, and by a scarcely perceptible furfuraceous desquamation.

As already stated, the disease usually runs its course in about eight or ten days. In some cases, however, it lasts longer, though rarely more than two or three weeks, and it is kept up in such instances, by the formation of successive rings. The eruption may appear upon any part of the body, but is much the most frequently met with upon the arms, shoulders, neck, and face, and especially upon the two latter. The only symptoms accompanying the eruption are slight pricking, smarting, and itching in the part. It is, according to Underwood, and such is also my own opinion, never contagious.

HERPES IRIS.—This is a very rare variety of herpes, one that I have never yet met with in children. It begins with small red spots, which are soon surrounded by four or five rings of different shades of redness. About the second day of the eruption, the central red spots present in their centres one or more vesicles, and on the third and fourth days, vesicles of very minute size generally appear on the outer concentric rings. After two or three days, the fluid contained in the central group of vesicles, which was transparent at first, becomes turbid, and about the fifth or sixth of the eruption, it is absorbed, and the disease terminates by a slight desquamation. The vesicles formed on the outer ring undergo the same changes as those described as occurring in the central ones. In some instances, the vesicles open, and their contents escaping, form small, thin, and brownish scales, which fall off in ten or twelve days.

Herpes iris may attack any part of the body, but is most frequently developed upon the face, hands, fingers, and neck.

DIAGNOSIS.—The diagnosis of herpes is seldom attended with any difficulty. The small size of the vesicles, their globular shape, their number, their aggregation upon distinct patches of inflamed integument, and the slight degree of constitutional disturbance attendant upon the disease, all render the eruption unlike any other cutaneous affection, and therefore easy of recognition.

Herpes phlyctenodes might possibly be confounded by an incompetent observer with pemphigus. The recollection that the eruption in pemphigus consists of distinct bullæ, much larger of course than the vesicles of herpes, while that of herpes phlyctenodes consists of numerous vesicles, much smaller than the bullæ of pemphigus, and closely dotted over isolated red patches, will always serve to distinguish the two affections. It might be mistaken also for eczema, when the vesicles of the latter are disposed, as sometimes, though rarely, happens, in groups. The distinction may be made, however, by attention to the facts that the eczematous vesicles are redder, less elevated, scarcely transparent, and that, though arranged in groups, they are confluent, whilst in herpes they are always distinct.

Herpes labialis is not likely to be mistaken for any other eruption. Herpes zoster may always be distinguished by the peculiar belted form assumed by the eruption.

Herpes circinatus might be mistaken in a certain state of its progress,—after the disappearance of its vesicles,—for lepra, when the latter has been deprived of its whitish scales. In lepra, however, the depression of the centre of the ring, and the elevation and hardness of the border, characters which are absent in ringworm, will almost always enable us to make the distinction. Moreover, the presence of some remains of vesicles in herpes, the absence of the eruption from other parts of the body, and the early disappearance of the disease, will almost always render the diagnosis easy and certain.

There is but one disease with which herpes iris is likely to be confounded, —roseola annulata. The entire absence of vesicles in the latter affection will always, however, enable us to make the distinction.

Prognosis.—The *prognosis* of herpes is always favorable. It is never in itself a dangerous disease, though the variety called zona often causes much suffering, and is moreover usually the expression of a considerable disturbance of the general health.

Treatment.—The different varieties of herpes seldom require more than the mildest treatment. In all, attention should be paid to the general health. The diet must be regulated according to the state of the digestive function. When constipation is present, especially if there be some febrile reaction at the same time, gentle laxatives ought to be administered, such as sulphur, magnesia, syrup of rhubarb and magnesia, or castor oil. If the skin be sallow, the tongue heavily coated, the breath foul, and the stools scanty and light-colored, or very offensive, small doses of blue pill in combination with rhubarb, or followed by rhubarb and magnesia, would be the most appropriate remedy. Excessive or frequently-repeated doses of any kind ought to be avoided, as the debility and gastro-intestinal irritation that so often follow such practice, are more injurious than the original disease.

The local treatment of herpes is important, and is, indeed, in many cases, all that is necessary.

Herpes phlyctenodes requires nothing more than mucilaginous lotions, an occasional warm bath, or the frequent moistening of the eruption with a liniment made of equal parts of lime-water and sweet oil. Herpes labialis, if it demand local treatment at all, may be relieved by the use of any mild lip-salve: a very good ointment is one composed of equal parts of Goulard's cerate and simple cerate, with a few drops of glycerine. Mr. Wilson recommends the following ointment:

℞.—Unguent. Flor. Sambuci, ... ℥i.
Liq. Plumbi, ... ʒi.—M.

During the early stage of herpes zoster, the local treatment should be such as will tend to allay inflammation and relieve pain. These effects may be obtained by applying compresses moistened with some kind of mucilage, such as barley water, or decoction of flaxseed or slippery-elm bark, or with simple cold water, or with weak lead water and laudanum. When the eruption is followed by excoriations or ulcerations, and the pain is severe, the latter may be allayed by the use of an ointment consisting of equal parts of Goulard's cerate and lard, either alone, or containing two or three grains of opium, or half a drachm of the watery extract of opium. Underwood recommends, when the discharge has subsided, and the scabs have formed and become adherent, that they should be anointed twice daily with the ung. hydrarg. ammoniat.

The local treatment I generally use for the herpes circinatis, and it rarely fails, is a solution of sugar of lead in distilled water, in the proportion of a drachm to the ounce. This is to be rubbed over the herpetic ring two or three times a day. Gibert (*Trait. Prat. des Mal. de la Peau*, p. 162) recommends the following ointment, when the disease becomes chronic:

℞.—Calc. Sulphuret., ...	ʒi.
Camphoræ, ...	gr. xv.
Axungiæ, ...	℥i.—M.

Herpes iris seldom requires any treatment. If any be determined on it should consist of alkaline lotions, or of water rendered slightly astringent by the addition of alum, or sulphate of zinc.

ARTICLE III.

SCABIES.

Definitions; Synonymes; Frequency.—Scabies is a contagious vesicular eruption, in which the vesicles are pointed, generally discrete, and from which, as a general rule, run off small red lines, of one or several lines in length. It is attended with severe itching, and it is caused by the presence in the skin of a small insect, called the Acarus Scabiei.

It is called also psora, and itch.

It is a frequent disease amongst the children of the poor and needy in the large cities of Europe; but, so far as my observation goes, is rare in this city.

Causes.—Itch is a contagious malady, and is in all probability caused only by contact, either immediately with some person laboring under the disease, or with articles of clothing worn by an infected individual.

It is much more frequently met with amongst the poor and destitute, whose habits are uncleanly, who live closely packed together in small and inconvenient houses, and in whom, therefore, the means of communication are abundant, than amongst the easy classes of society, whose habits, and, consequently, liability to contact, are the opposite of those just named.

The disease usually appears in children in from four to five days after the exposure to contagion. In healthy, sanguine children, it often shows itself within a shorter time,—after two days,—while in those who are feeble and weakly, the period of incubation may be even longer than four or five days.

SYMPTOMS.—The first symptoms of itch appear in the part to which the cause, a contagious contact, may have been applied. In infants at the breast, it is usually first developed on the hips and thighs, as it is those parts that are most constantly in contact with the nurses who carry the child, and from whom young children generally receive the infection. In older children, the disease commonly appears first on the wrists and between the fingers, and extends thence more or less quickly to the flexures of the elbows, and to the axillæ and abdomen. It rarely or never attacks the face in adults; but in children, even this part is not, according to M. Richard, exempt. (*Trait. Prat. des Mal. des Enfants*, p. 590.)

The disease is always attended with severe itching, which, in infants, causes uneasiness and fretfulness, and in older children violent scratching. The itching is increased by the heat of the bed-coverings, and is, therefore, most troublesome at night. The eruption appears in the form of more or less numerous vesicles, which are small, discrete, acuminated, and transparent at the top. The vesicles are at first of a faint rose color, and they contain a viscid, transparent serum. Their number is variable, being sometimes very abundant, and at others sparse. They either open spontaneonsly, or are soon broken by the fingers or clothes, and are followed by small, thin, slightly adherent scabs. In some instances the action of the nails causes slight effusions of blood, which dry into small bloody scabs, like those of prurigo, thus embarrassing, to a certain extent, the diagnostic of the disease. Sometimes, particularly when the inflammation attendant upon the eruption, or that caused by scratching, is marked, there are, intermingled with the psoric vesicles, pustules of impetigo, or perhaps of lichen, which tend like the sanguine crusts, just alluded to, to render the diagnosis difficult.

When a recent vesicle is carefully examined, there may generally be observed running off from it, in a straight, curved, or zigzag direction, a whitish or reddish line, like that produced by the scratch of a pin. This line marks the course of the acarus scabiei in its burrowings under the epidermis, and is called the cuniculus, or burrow. It varies in length from one or two, to five or six lines. At the point where it terminates opposite to the vesicle, there is usually to be seen a small rounded projection; deeper in color than the rest of the cuniculus, beneath which lies the insect. The acarus can often be found at this spot, and removed, by carefully introducing horizontally under the epidermis the point of a small needle, and by manipulation so as to take off a small layer of the epidermis. The insect clings to the point of the needle, and can then be extracted from its lodgment.

The number and extent of the vesicles vary greatly in different subjects. In some they are confined to limited surfaces, while in others, and particularly in robust, sanguine children, and in those who are neglected and imperfectly cleansed, they extend to many different parts, or over the greater part of the body.

Itch occasions in children much irritability and suffering, and when neglected may injure seriously the general health, and cause emaciation and debility.

The acarus scabiei is an arachnoid insect, varying, according to Mr. Wilson's measurements, between $\frac{1}{147}$ and $\frac{1}{77}$ of an inch in length, and between $\frac{1}{303}$ and $\frac{1}{93}$ of an inch in breadth. It is of a whitish and shining color, when examined with the naked eye, of a globular form, and is provided with eight legs, four anterior and four posterior. A most accurate and minute account of the structure of the insect is given by Mr. Wilson in his work on diseases of the skin.

Diagnosis.—The most characteristic marks of itch are the presence of the cuniculi and of the insect which causes the disease. If the acarus can be extracted from the skin, there will remain, of course, no doubt; and if the cuniculi be distinct and numerous, the diagnosis becomes almost as certain as when the insect itself is obtained.

When, on the contrary, the insect cannot be found, and when the cuniculi are absent or not distinct, the diagnosis becomes more uncertain. The diseases with which it is most likely to be confounded are eczema simplex, prurigo, and lichen simplex. From the former it may usually be distinguished with certainty by attention to the following points. In eczema the vesicles are flattened, or globular, scarcely raised above the surface, and they are collected together in clusters; in itch they are acuminated, elevated and either entirely distinct, or much less confluent than in eczema; in eczema there is a sensation rather of pricking than itching, whilst in itch, the sense of itching is severe and distressing; and lastly itch is communicable by contact, whilst eczema is never contagious.

Prurigo begins with papules which always remain such. The scabs in prurigo are small and black, consisting of coagulated blood caused to exude by the rubbing off of the top of the papule; while in scabies the scabs are more like like thin, yellowish, and friable scales. The seat of the two eruptions is different. Prurigo is developed upon the back, the shoulders, and upon the extensor surfaces of the limbs; while itch appears first about the thighs and buttocks, between the fingers, or about the flexures of the joints. Lastly, prurigo is never, itch always, contagious.

Lichen simplex is a papular disease, in which the papules are closely agglomerated, while scabies is a vesicular affection, with the vesicles discrete. Lichen sometimes affects the hands, and might then be mistaken for itch; but in the former the eruption affects the dorsal surface of the hands, while in the latter it appears in the interspaces of the fingers. Lichen is never attended, as itch always is, by severe pruritus. Attention to these points of difference will almost always render the diagnosis of the two diseases very easy and certain.

When, as sometimes happens, scabies is intermingled with other eruptions of the pustular, papular, or vesicular kind, the diagnosis can be arrived at with certainty, only by careful attention to the cuniculi, or by the detection of the insect. When neither of these characteristic conditions are present to mark the true nature of the disease, there will always remain some doubt as to the diagnosis.

Prognosis.—Itch is a mild disease, which never disturbs the health seriously.

Treatment.—In children, as in adults, the best treatment for itch is the use of sulphur by inunction. The ungt. sulphuris of the American Pharmacopœia, consisting of one part of sulphur to two of lard, should be well rubbed into the skin before a fire, morning and evening, for two days. The child should be kept in a flannel gown, and in bed, during this treatment. On the morning of the third day, the skin may be washed clean with soap and water, or by immersion in a warm bath. This plan rarely fails to effect a cure. Should it happen, however, to fail, the treatment must be repeated.

As the use of the sulphur ointment is sometimes objected to in private families, on account of its disagreeable odor, various substitutes have been recommended. Mr. Wilson states that he found camphor dissolved in oil, in the proportion of one drachm to the ounce, answer every purpose of eradicating the disease; and Dr. Coley (*Pract. Treat. on Dis. of Children, Phil. ed.* 101) speaks highly of an ointment composed of a drachm of iodide of potassium to an ounce and a half of lard, of which a little is to be applied all over the body, except the head and face, every night.

The disease rarely requires any constitutional treatment. If, however, any complication exist, or the general health be deranged in any way, such measures as may be necessary for the removal of either of these conditions should be employed, in connection with those proper for the specific disease.

CHAPTER III.

BULLÆ.

ARTICLE I.

PEMPHIGUS OR POMPHOLYX.

Definition; Synonymes; Varieties; Frequency.—Pemphigus is an eruptive disease, characterized by the presence on one or several parts of the body, of more or less numerous bullæ of considerable size, nearly always isolated, resting upon circular or oval erythematous patches, about as large or somewhat larger than the bases of the bullæ themselves. The bullæ form in the course of a few hours, and contain at first a limpid serum, which soon becomes reddish or turbid; they terminate by desiccation and the formation of thin crusts, or by rupture, and the escape of their contents, when there remains behind a superficial ulceration.

Authors formerly described numerous varieties of this disease, and gave to some of them the title of pompholyx. Of late years, however, these have been reduced to a few forms, and I shall confine my remarks to those most apt to occur in children. The only variety which is really important in children is the pemphigus acutus. The pemphigus chronicus, a dangerous and not unfrequent variety in old people, is so rarely met with in early life, as to make it unnecessary for me to describe it. Another species of bullar eruption, formerly called pemphigus infantilis, is now more properly classed as rupia escharotica, under which title I shall give an account of it.

Pemphigus is not unfrequently met with in young children who become the inmates of hospitals, almshouses, and foundling hospitals, and amongst the poor and destitute classes of large cities. Still it cannot be said to be a frequent disease.

Causes.—The causes of pemphigus are often obscure or entirely inappreciable. It is usually supposed, however, to depend, in children, upon the influence of the act of dentition, on disturbances of the gastro-intestinal tube brought about by improper food or over-feeding, and on general disorder of the nervous system. It is said to occur sometimes as a congenital affection, and also to be hereditary.

Symptoms.—Acute pemphigus may be confined to a very small portion of the cutaneous surface, or it may affect several regions of the body at once. It is usually attended with symptoms of constitutional disturbance, which, especially in very young infants, may be slight, consisting merely of general uneasiness, languor, and some acceleration of the pulse; or they may be severe, exhibiting in such cases a dry and burning skin, frequent pulse, thirst, and loss of appetite.

After the above constitutional symptoms have lasted one, two, or three days, the eruption makes its appearance in the form of small circular red spots, which increase in size, and soon exhibit a bleb or bulla rising in the middle or over the whole of the red spot. The vesicle commonly appears a few hours after the red patch, and consists of an elevation of the cuticle by an effusion of serum beneath it. The bulla rapidly distends by the increase of the serous effusion, until it attains the size of a pea, a hazelnut, or a large walnut. It is of a circular or oval form, and may be confined to the centre of the erythematous surface on which it rests, being surrounded in such case, by a more or less wide red line of inflammation, or it may occupy the whole or nearly the whole of the red patch, under which circumstances it entirely conceals the latter, or is surrounded by a very narrow red ring. The color of the areola around the bulla is very bright during the first day of the eruption, while the integument between remains perfectly healthy.

The fluid contained in the bullæ soon becomes turbid; the bullæ become wrinkled, and usually burst after one or two days, and are replaced by thin yellowish or brownish scabs. The crusts begin to form before the redness of the integument has disappeared. In some instances the bullæ do not break, but their contained fluid becomes yellowish in color, and then turbid; it diminishes by absorption, and, at the end of about a week, dries into a thin dark-colored scab. The crusts usually fall off in the course of two or three weeks, leaving the skin beneath of a reddish color, but in other respects healthy. The whole duration of the disease is commonly from one to three weeks, the time in each case varying with the mode of the eruption;—when all the bullæ appear simultaneously, seldom lasting more than one or two weeks; while in cases in which they appear at successive periods, lasting three or even four weeks.

Diagnosis.—The diagnosis of pemphigus acutus is seldom difficult. The large isolated bullæ, seated on inflamed patches of the integument, filled with transparent serum, and followed by thin lamellated scabs, are unlike almost any other kind of eruption. From rupia, the other form of bullar disease, it is to be distinguished by the small number of blebs in the former, by their greater flatness, and by the facts that these are followed by true ulcerations, and by thick and prominent scabs.

Prognosis.—Acute pemphigus is rarely dangerous when it exists without complications. When, however, it is very extensive, and accompanied with severe constitutional symptoms, and particularly when it exists in connection with other diseases, or occurs in a child whose health has been broken down by unwholesome hygienic influences, it may assume a dangerous character, and the prognosis should, therefore, always be guarded under such circumstances.

Treatment.—Simple acute pemphigus requires, as a general rule, no other treatment than attention to diet, and regulation of the digestive function. When constipation is present, this should be overcome by means of simple enemata, or by the use of some mild laxative, as manna, spiced syrup of rhubarb, or very small doses of castor oil. If the discharges be too frequent, they should be restrained by the use of opium in doses proportioned to the age of the child. In young infants, it will often be found that the gastro-intestinal secretions are of an acid and irritating character. This condition may be treated with small doses of paregoric or laudanum, combined with lime or magnesia water, or with soda. The diet must be managed according to the state of health of the child. For an infant a good breast of milk is, of course, the best treatment in the world. For older children, the diet ought to be light and unirritating, but, at the same time, nourishing and strengthening.

The local treatment should consist, in the early stage, of an occasional warm bath. When the bullæ have fully formed, they ought to be punctured, and the fluid gently pressed out, care being taken not to remove the cuticle, as this forms the best possible dressing for the inflamed integument. When the bullæ are followed by excoriations, these may be dressed with an ointment consisting of equal parts of Goulard's cerate and simple cerate, made a little soft by the addition of glycerine, or with carrot or elder-flower ointment, or with Turner's cerate.

When the child shows signs of debility during the progress of the disease, and also when the eruption tends to assume a chronic course, the treatment ought to be tonic and invigorating. It should consist in the use of a nutritious diet, and in the exhibition of tonics, as Huxham's Tincture of bark, in small doses, quinine, cod-liver oil, or in the use of wine whey, or small quantities of brandy.

ARTICLE II.

RUPIA.

Definition; Varieties.—Rupia is an eruptive disease, characterized in its early stage by distinct, somewhat flattened bullæ, of more or less considerable size, containing at first a serous, and then a purulent or blackish fluid: at a later period the disease exhibits very thick scabs, and still later, ulcerations.

There are three varieties of this eruption: *rupia simplex, rupia prominens*, and *rupia escharotica*. The latter variety was formerly described under the title of *pemphigus infantilis* and *pemphigus gangrenosus*, and is known in Ireland under the different names of white blisters, eating hive, and burnt holes. It is the most important variety of the disease in young children.

Causes.—Rupia is most apt to occur in weakly, badly-nourished, and scrofulous children, and seems to depend, therefore, upon that state of debility and exhaustion of the general health, which results from exposure to unfavorable hygienic conditions, which follows exhausting diseases, or which exists as a consequence of some hereditary taint.

Symptoms.—*Rupia simplex* begins almost always on the inferior extremities, or more rarely on the trunk or arms, without previous inflammation, in the form of small, flattened bullæ, of about three or four lines in diameter. The bullæ contain at first a serous and transparent fluid, which soon becomes thicker, and is converted into pus. At an early period they shrink and become wrinkled, their contained fluid hardens and is converted into rough, brownish scabs, which are always thicker at the centre than on the edges, and which leave beneath, after their fall, superficial ulcerations. These ulcerations either soon cicatrize and disappear, or are covered by fresh scabs. After the fall of the final scabs, there yet remain, for some time longer, dark brown or livid spots, which gradually fade and disappear.

Rupia prominens exhibits the same general characters as the preceding variety, but with more marked and peculiar features. The eruption commences with a circumscribed inflammation of the skin, on which inflamed spot soon appears a bulla filled with yellowish serum, or sometimes with a blackish fluid, which rapidly hardens into a brownish or blackish wrinkled crust. The crust is surrounded by an erythematous areola, formed by the extension of the cutaneous inflammation beyond the circumference of the scab. Upon this areola a fresh elevation of the cuticle, by purulent deposit, often takes place, which, by its desiccation, adds to the size of the crust. This successive increase at the margin of the scab enlarges it in breadth, and, at the same time, raises the height of its centre, so as to give it a peculiar and characteristic appearance, and causes it to resemble very closely the shell of a limpet or oyster. The scabs thus formed usually adhere to the surface beneath with much tenacity, and remain attached for a variable, and, as a general rule, considerable length of time. When at length they fall off, or are removed, there are left beneath ulcers of variable depth and extent, which are either covered by fresh crusts, or, as more frequently happens, they remain open, presenting a foul surface of a livid red color, with thickened edges. The ulcers are difficult to heal, and after cicatrization, leave livid or purplish stains, which often remain for months. The number of bullæ is usually small, there being generally one at its height, and one or two about to appear, or on the decline.

RUPIA ESCHAROTICA.—This variety of rupia, formerly described as belonging to the class pemphigus, and then called pemphigus infantilis and gangrenosus, differs in some respects from the other varieties of rupia, and particularly in the absence of the thick and projecting crusts, which characterize rupia simplex and prominens. It occurs chiefly amongst cachectic children, appearing usually in the period between birth and the first dentition. It is seated generally upon the neck, chest, abdomen, scrotum, or inferior extremities.

The eruption begins in the form of purplish or livid spots, raised slightly above the level of the skin. Upon these spots the cuticle is soon elevated by a serous fluid, so as to form small bullæ, which become rapidly larger, until they attain their full size. The bullæ are smaller than in the other varieties of rupia; they are irregular in shape, flattened on the top, and are surrounded by purplish areolæ in the early stage of the eruption; the fluid they contain becomes, at an early period, turbid and dark-colored, or almost black. The bullæ soon wrinkle, burst, and leave ulcerated surfaces, which are painful, often covered with sloughs, secreting a sanious and fetid pus, and difficult of cure.

Soon after the formation of the ulcers, a fresh crop of bullæ, forming a new eruption, often appears and passes through the same phases as the first, thus prolonging and extending the disease. This form of rupia is attended with much pain, with fever, sleeplessness, restlessness, and often ends fatally from the severe and continued irritation kept up by the disease. In cases ending favorably the process of cicatrization is always slow and difficult.

DIAGNOSIS.—Rupia is likely to be confounded only with pemphigus and ecthyma. Pemphigus is to be distinguished from rupia by the larger size and greater distension and prominence of its bullæ; by the fact that the contained fluid of the latter is serous and transparent in pemphigus, instead of being turbid and sanguinolent, as in rupia; by the different character of the crusts, which, in pemphigus, are thin and lamellated, while in rupia they are thick and rugous; and, lastly, by the deep and unhealthy-looking ulcerations that follow rupia.

Ecthyma is unlike rupia in being a pustular disease from the first. Moreover, the pustules of ecthyma are surrounded by a highly inflamed areola, which is not the case in rupia, while the crusts in the former disease differ from those of the latter in being smaller, harder, more irregular, and more adherent.

PROGNOSIS.—Rupia simplex and prominens, though tedious and slow of cure, seldom prove fatal, while rupia escharotica is always dangerous, and in very weakly children, especially when these are exposed to bad hygienic conditions, very generally ends unfavorably.

TREATMENT.—The most important point in the treatment is to attend to the hygienic state of the patient. When the child is living in an unhealthy house, or a close and confined room, it should be removed, if possible, to a more salubrious position, or to a larger and well-ventilated room. The diet ought to be such as to invigorate the strength, and promote the nutrition of the body. For an infant who is fed upon artificial food, or who is suckling a nurse of doubtful health, the best remedy in the world is a fresh and full breast of milk. If a nurse cannot be procured, the diet must be most carefully regulated, and should consist of goats' or asses' milk, if it have been found by previous trial that other kinds of food fail to nourish the body properly. While the diet is thus attended to, it is necessary to watch the state of the digestive organs, and if there be either constipation or diarrhœa, these must be overcome by suitable remedies. Tonics and stimulants are always advisable in this disease, and may consist either of brandy or wine, given alone, or in connection with Huxham's tincture of bark, extract of cinchona, small doses of quinine, iron, cod-liver oil, or any other remedy of this kind that may be preferred.

Rupia simplex and prominens are to be locally treated in the early stage by opening the bullæ as soon as they form, and covering them with dry lint and a light bandage, or with the water-dressing. The ulcerations that follow the bullæ may be treated with Goulard's ointment applied on pieces of fenestrated lint, and by washing occasionally with lime-water, or with weak solutions of alum, copper, zinc, or nitrate of silver. At a later period of the disease, when the ulcerations are covered with the characteristic thick crusts, these are first to be removed by means of poultices of bread-and-water or flaxseed meal, and the surfaces beneath them treated with the applications recommended above. When the ulcerations are very obstinate and difficult to heal, they should be modified by occasional touchings with nitrate of silver, either pure or in strong solution, or with dilute nitric or muriatic acid.

Billard recommends that the ulcerations should be dusted with powdered alum or cream of tartar, and Rayer also speaks very highly of the last-named application.

Dr. Stokes found that the best treatment in epidemic rupia escharotica was an ointment of the scrophularia nodosa, made by stewing the small leaves of the plant in as small a quantity of unsalted butter as may be sufficient to prevent their scorching. The ointment is to be warmed until it becomes quite thin and then applied by means of a brush, after which the surfaces are to be covered with lint smeared with the same ointment. The dressing is to be renewed every six hours.

CHAPTER IV.

PUSTULES.

ARTICLE I.

ECTHYMA.

Definition; Synonymes; Varieties.—Ecthyma is an eruption characterized by prominent, rounded, and usually discrete pustules of considerable size, with hard and inflamed bases. The pustules are followed by thick brownish crusts, which leave in their fall a reddish mark, or more rarely, a superficial ulcer or a true cicatrix.

Ecthyma has been called also phlyzacia. There are two varieties of the disease to which children are subject, *ecthyma vulgare* or *acutum*, and *ecthyma infantile*.

CAUSES.—The most frequent causes of ecthyma are the application of irritating substances to the skin, such as croton oil and tartar emetic ointment, and the presence of other eruptions upon the skin, particularly smallpox, measles, scarlet fever, herpes, or scabies. The causes just named give rise to the variety called ecthyma vulgare, which, it may be well to state in this place, is of an acute character, and has therefore been called by some writers ecthyma acutum. The other variety of the disease, ecthyma infantile, is a chronic affection, and occurs almost always in feeble, badly nourished, and cachectic children, and in those whose health has been injured and broken down by exhausting diseases, and particularly by disorders of the gastro-intestinal apparatus.

SYMPTOMS.—*Ecthyma vulgare* occurs most frequently on the extremities and neck, and more rarely on the trunk of the body. It appears in the form of small, red, and circumscribed spots, projecting above the surface of the skin, hard to the touch, and accompanied by smarting and often severe pain, and by soreness on pressure. The centre of the spots is soon elevated into a pustule, filled with a purulent fluid. The size of the pustules varies, but it is usually about that of half a pea. Each pustule is generally surrounded by a hard base of a bright red color, constituting an areola, while, in some instances, the whole of the red elevation is covered by the pustular formation. The pustule remains unchanged usually for three or four days, and more rarely for a week, and is then converted by the drying up of the effused fluid, into a thinnish brown scab, which drops off after a few days, and leaves a congested purple spot that remains for some time longer. In other instances, the pustule breaks and leaves a small ulceration which terminates with a slight cicatrix. The eruption is commonly successive, and is seldom accompanied by any febrile reaction.

Ecthyma infantile is much more frequently met with than the other variety of the disease, and occurs in a single, or oftener in successive eruptions, in feeble, badly-nourished, and cachectic children. It appears on the neck, shoulders, arms, and chest, and especially upon the lower extremities. It is often connected with some chronic disorder of the digestive or respiratory apparatuses, and is developed during the state of debility and exhaustion to which children are reduced by those affections.

The pustules of ecthyma infantile are of variable size, some being small, and others as large or larger than a sixpence. They are circular in form, and surrounded by an areola of a red or purplish tint; the fluid which they contain is generally not very thick, and is of a dark or sanguinolent appearance; they terminate by the formation of a dark and adherent crust, by absorption of the contained fluid and a kind of desquamation, or by a bloody excoriation, or true ulceration, which are followed by a deep stain upon the skin or a true cicatrix.

Diagnosis.—Ecthyma is more likely to be confounded with rupia, than with any other disease. The pustular character of ecthyma, from the very beginning, will, however, almost always enable us to distinguish it from the broad and distended bullæ of rupia, filled with sero-purulent fluid; and the difference between the two becomes still more marked, when we recollect the hard and inflamed bases on which the pustules of ecthyma rest, and the shapeless crusts and superficial excoriations of that disease, instead of the projecting, rugous, and imbricated scabs, and deep ulcerations of rupia. Ecthyma is not at all likely to be mistaken for the small and numerous pustules of impetigo, or the umbilicated ones of small-pox.

Prognosis.—Ecthyma is never a dangerous disease in itself. If any danger accompany it, it arises rather from the enfeebled and disordered state of the general health under the influence of which it is produced, than from any injury caused by the eruption. The prognosis must depend, therefore, upon the state of the general health existing during the attack of the disease.

Treatment.—In both varieties of ecthyma, attention to the general health of the patient constitutes the most important point in the treatment. In the acute form, mild laxatives, small doses of some alterative, as the hydrargyrum cum cretâ or sulphur, the use of a nutritious and wholesome, and especially of an unstimulating diet, and the local application of mucilaginous infusions, or of a mild and cooling ointment, as Goulard's cerate, Turner's cerate, or the carrot, cucumber, or elder-flower ointments, with occasional warm bathing, are all that the case demands. In the ecthyma infantile, the attention of the physician should be directed towards the restoration of the general health, which, as stated above, is always more or less deteriorated. As this deterioration depends usually upon the exposure of the child to unwholesome hygienic influences, and a consequent unhealthy state of the digestive and nutritive functions, it is of primary importance that these should be early attended to. The patient ought to be placed in a healthy and well-ventilated apartment; the clothing must be regulated according to the age of the child, and the season of the year; and, what is most important of all, the diet ought to be such as is digestible, suitable to the age, and, at the same time, nourishing and strengthening. The internal remedies must consist of tonics in all cases, and when the digestive power and general strength are reduced much below the normal standard, of stimulants. The best stimulant is old and pure brandy, either given mixed with water, three or four times a day, or combined with the food. The best tonics are in most cases, some preparation of iron, and the one I prefer is the iodide, given mixed with syrup of ginger, or, when the bowels are not too irritable, with small quantities of the compound syrup of sarsaparilla, or cod-liver oil. When, for any reason, iron is not given, quinine, or extract of cinchona, may be substituted. While these remedies are being employed, or prior to their administration, the gastro-intestinal functions ought to be carefully regulated by the use of mild laxatives when the bowels are constipated, or by some kind of astringent when they are loose and disordered.

The external or local treatment must consist in the use of mild demulcent applications, or of soothing or cooling ointments, during the pustular stage of eruption. When unhealthy excoriations or ulcerations follow the pustules, these may be brought into good condition by the employment of weak solutions of nitrate of silver or sulphate of zinc, or of a very weak lotion of nitric or muriatic acid.

ARTICLE II.

IMPETIGO.

Definition; Synonymes; Varieties; Frequency.—Impetigo is a non-contagious, subacute inflammation of the skin, characterized by an eruption of one or more crops of small, yellow, hemispherical, and flattened pustules. The pustules are disseminated, or collected in clusters, and end, by the drying up of their contents, in thick, rough, and yellowish scabs.

Impetigo has been called also psydracia, melitagra, and crusted tetter, or scall. When seated upon the scalp, it is often called by the English milky-crust or milk-crust, crusta lactea, tinea lactea, and porrigo larvalis, and by the French, croûte de lait, gourme, and impetigo larvalis and granulata.

There are, in reality, but two specific varieties of the disease, *impetigo figurata*, and *impetigo sparsa*, so named from the manner in which the pustules forming the eruption are arranged. From the greater frequency and severity of the disease, however, as it appears upon the scalp in young children, it has become customary to describe it, when seated upon that part, under different titles. What constitues impetigo figurata upon the general cutaneous surface, becomes, when seated on the scalp, impetigo larvalis or capitis, whilst the impetigo sparsa of the general integument receives, upon the scalp, the title of impetigo granulata. Though I do not believe that there are any other important differences between impetigo larvalis and granulata, and impetigo figurata and sparsa, than those of seat, degree of severity, and frequency of occurrence, I deem it best to describe them separately, for the reasons that it is most customary so to do, and because the disease as seated in the scalp is much more frequent, severe, and difficult of cure, than when situated elsewhere.

Impetigo capitis is one of the most common eruptions to which children are liable. Setting aside, indeed, the eruptive fevers, and roseola, it is probably the most frequent of all. Impetigo figurata and sparsa of the body and limbs are not at all rare, though much less frequently met with as distinct eruptions, than impetigo capitis.

Causes.—The causes of impetigo, like those of most other eruptions, are very imperfectly understood. The only one which seems to be at all satisfactorily determined is the influence of the process of dentition. Certain it is that most of the cases of the disease occur during either the first, or the early part of the second dentition; but wherefore this particular part of the evolution of the organism should give rise to the development of impetigo, is, to say the least, very imperfectly explained.

Impetigo capitis or larvalis is, more clearly than the other varieties, connected with dentition. Of twenty cases of this form of which I have kept a record, nineteen began either just before, or some time during the evolution of the milk-teeth, and the remaining case occurred during the early part of the second dentition. Writers have enumerated various other causes as apt to give rise to this form of impetigo, and particularly the lymphatic temperament, deteriorated general health, the scrofulous or tubercular diathesis, and exposure to unhealthy hygienic conditions, as want of cleanliness, insufficient or improper food, and crowded or ill-ventilated habitations. Mr. Wilson is of opinion that the crustea lactea of children depends upon the same causes as eczema infantile. At page 171, he says: "Eczema infantile, like eczema adultorum, originates in mal-assimilation, and, with good reason, is commonly ascribed to a faulty secretion of milk on the part of the mother; but when once established, is not remedied, as might be expected, by the withdrawal of the cause, and the substitution of a different and less faulty food." Others, again, and especially Underwood, MM. Rilliet and Barthez, and MM. Cazenave and Schedel, state that it occurs as well in healthy and robust as in weakly and scrofulous children; and this, I may remark, agrees with my own experience, since of the twenty cases above referred to, in only eight was there an unquestionable tubercular taint to be found in the parents, whilst in twelve the health of the parents was good and strong. My own experience proves, also, that want of cleanliness and unfavorable hygienic conditions are not necessary elements in the causation of the disease; for all of the twenty cases referred to occurred in children who had every advantage of good nursing and care that ease of circumstances, and even wealth, could give. I have been inclined at times to suppose that artificial diet, either alone, or employed in connection with nursing, has been one of the causes of the disease. Upon examining my record of cases, however, I find that of sixteen cases in which the kind of diet in use at the time of the appearance of the eruption was carefully noted, in ten artificial food was partly depended upon, while in six the child was confined to the breast alone,—a difference insufficient to allow of the conclusion that the use of artificial food has any paramount influence in the production of the disease. Nevertheless, I am disposed to believe that the use of artificial food early in infancy, by disordering the digestive function, and rendering the process of dentition more difficult and perturbed, may be regarded as one of the causes of the disease.

SYMPTOMS.—In my account of the symptoms of impetigo, I shall describe first the variety of the disease which is the most important from its frequency, extent, and severity. This is the impetigo larvalis or capitis.

Impetigo Larvalis differs greatly, in different cases, as to its extent and intensity. In some children the eruption is confined entirely to the face, or to portions of the face, constituting the impetigo figurata of that part, or it may be confined to the scalp alone; or again, it may attack the whole scalp, the face, ears, and neck, and may be associated, as I have seen it, with severe and extensive impetigo figurata of the upper part of the trunk of the body, of the greater part of the upper extremities, and even of portions of the lower extremities. It may be very acute in its character, attended with severe and painful inflammation of the integument, or it may be subacute; or, lastly, it is sometimes so mild as to produce scarcely any irritation of the part upon which it is seated.

When mild in its features, it consists of an eruption of numerous small pustules, spread over certain portions of the scalp, to which it may remain limited; or it may cover at the same time, or it may attack alone, the forehead, temples, and perhaps portions of the cheeks. It is attended, under these circumstances, with very slight redness and heat of the integument. The pustules discharge their fluid contents, and form thin crusts, which gradually fall off, leaving slightly reddened or excoriated surfaces, which soon disappear, or are followed by fresh crops of pustules, destined to pass through the same changes as the preceding ones.

In more severe cases the disease may be confined either to the scalp or face, or it may, as stated above, exist upon both simultaneously. The eruption presents different appearances in these two situations.

On the scalp, the eruption may be either partial or general. It usually attacks but a small surface at first, and gradually extends thence to the surrounding parts. The pustules are yellowish-white in color, very numerous, of small size, and attended with heat and itching. They soon open or are torn by scratching, and discharge a thick and viscid fluid, which glues the hairs together and hardens into uneven brownish-yellow crusts. If the scalp is not kept clean by constant washing, or by emollient applications, the crusts increase rapidly in thickness by successive discharges of fluid from the pustular surface beneath, until at length the whole of the diseased part is covered with thick, heavy, rough, and adherent crusts, of a brownish or yellowish-white color. When neglected, the crusts become more and more thick, and from the heat of the head and exposure to the air, they undergo partial decomposition, and exhale a fetid, sickening odor, of the most disgusting kind. Amongst the children of the poor and destitute, lice often form in abundance and add to the repulsive character of the disease. At first, the crusts are somewhat soft and moist, from the percolation through them of the fluid exhaled beneath, but, as they become more abundant and thicker, their outer surface becomes dry and sometimes very friable. The secretion from the inflamed surfaces often makes its way under the crusted mass above, and, flowing down over the forehead and behind the ears, irritates the parts that were before healthy, and thus extends the disease.

When the crusts are removed by any means, the surface of eruption is found to be red, shining, wet, and discharging an abundant purulent and sero-purulent fluid, which escapes from minute excoriated points dotted thickly over the inflamed scalp. The integument is at the same time often tumefied, and tender to the touch. When the disease has lasted a considerable length of time the inflammatory action extends to the hair-bulbs, and occasions often partial loss of the hair over larger or smaller surfaces. This kind of alopecia is never, however, permanent. The hair-bulbs are not destroyed, but merely inflamed, so that the hair grows again after the cure of the disease.

On the face, the disease usually shows itself first on the forehead and cheeks, to which parts it may remain limited, or whence it may extend to the lips, chin, ears, and neck. The nose and eyelids are seldom attacked, though I have occasionally seen the upper eyelids slightly affected. The eruption begins in the form of pustules, whose development is attended with severe pruritus. The pustules are sometimes very small, acuminated, and more or less closely aggregated together, and they give rise, by their rupture, to thin lamellated crusts; while in other cases, they are large and are followed by much thicker and larger crusts. When the pustules are very numerous and large, the accompanying inflammation severe, and the discharge copious, and when the formation of the crusts is not interfered with by topical applications, or by the scratching of the child, large portions of the eruptive surface become covered with thick, brownish, or brownish-red crusts, which present the general appearance of a mass of incrustation, broken by cracks and fissures into portions of very irregular size and shape. When the crusts are removed by any cause, the skin beneath appears red, inflamed, and wetted with a more or less abundant sero-purulent fluid, sometimes mixed with blood, that oozes from numerous small points on the excoriated and inflamed surface. The eruption is attended with severe itching, to gratify which the child often tears the affected surface with the nails, so as frequently to remove the crusts, wound the skin beneath, and cause more or less bleeding from the part.

Impetigo larvalis, whether confined to the scalp or face, or existing on both parts at once, causes, when it exists in the acute form, much distress and annoyance to the child. The heat and tension of the part, and particularly the itching, occasion much restlessness and irritability; they make the child cross and peevish, disturb its sleep, and sometimes cause slight febrile attacks, which debilitate and injure the health. In other cases, however, the general health remains perfect,—all the functions of the body going on well, notwithstanding the local distress and irritation. The lymphatic glands situated behind and in front of the ear, and those on the back and front of the neck, frequently inflame, enlarge, become hard and painful to the touch, and, in a few instances, suppurate, though the latter occurrence is not frequent.

The duration of impetigo larvalis is very variable in different cases. Mild cases, and particularly those in which the eruption is confined to a limited extent, often get well, or are readily cured, in two or three months. When, on the contrary, the disease is severe and extensive, the duration is much longer, seldom less, according to my experience, than several months, or even one or two years. In most cases, however, the intensity of the disease varies from time to time, so that at one period it may seem to be subsiding rapidly, or it may even disappear almost, or be very greatly ameliorated, only to break out again with renewed violence under the influence of some exciting cause, as the cutting of new teeth, some change in the weather or season, or some alteration in the health of the child which cannot be explained.

This variety of impetigo is, as already stated, almost entirely confined to the age of dentition. Of the 20 cases of which I have kept a record, 19 occurred some time during the first, and one during the early part of the second dentition. The disease often begins some months before the appearance of the first teeth, and, though it generally ceases, or is cured before the termination of the dentition, I knew it in one case to run on unchecked three months after the conclusion of that process, and then to be removed only by medical treatment.

Impetigo granulata is another form of the disease which is met with quite frequently in children during the first dentition. It begins with small yellowish-white pustules, developed singly, or in small groups, on the crown of the head alone, or scattered over the whole scalp. Most of the pustules are formed at the base of the hairs, and are pierced by the latter. They are accompanied by more or less inflammation, heat, and itching. After a few days,—two, three, or four,—the pustules break, and discharge their fluid contents, which concrete into dry, friable, brownish crusts of irregular shape, some of which are very adherent, matting together a larger or smaller number of hairs, while others are broken into small and dry fragments, and in this shape are dispersed amidst the hair. Not unfrequently, from the rubbing of the head against the pillow, and from scratching with the nails, the scabs are torn off, the pustular points are irritated, and slight furuncular inflammations take place, which add very much to the annoyance and distress caused by the eruption. In other cases, small oozings of blood take place from the above causes, and there are interspersed amongst the brownish-yellow scabs proper to the disorder, others which result from the coagulation of the effused blood.

This is a slight disorder in comparison with the impetigo larvalis, and is usually much more under the control of remedies, and of much shorter duration.

Impetigo figurata occurs most frequently on the face, either alone, or in connection with impetigo of the scalp. I have seen it also, in seven cases, seated upon the arms and forearms, and in a slight degree, on the upper parts of the trunk of the body, and on the inferior extremities, in connection with impetigo larvalis. I have met with five cases of this form of the disease in which the head was entirely free from it. Three of the five children were past the age of the first dentition. The seat of the disease is variable. In one, a boy ten years old, it was on the outside of the right thigh; in another, nine years old, on the left arm, at the point where a revaccination had been performed; in a third, in a boy five years old, on the front of the right leg, above the ankle; in a fourth, in a child two years old, on the left anterior side of the thorax, in the neighborhood of an abscess; and in a fifth, in a child a year and a half old, on the left leg, just above the ankle.

The appearances presented by impetigo figurata of the face have already been described under the head of impetigo larvalis. When seated on the trunk or limbs, the eruptive surface is usually large. On the upper limbs I have seen it extend from the shoulders to the hands, and, as a general rule, it has been most severe on the outer portions of the limbs. On the trunk and lower extremities it has usually affected surfaces of much less considerable size, and has commonly appeared in a patch of an irregularly oval shape, and of four, five, or six inches in diameter.

Impetigo figurata of the trunk and limbs presents much the same appearances as those already described in my account of impetigo of the face. The eruption begins with small, slightly projecting, and closely agglomerated pustules, developed upon red and inflamed patches of variable size. The pustules usually break in from one to three days after their formation, and discharge a purulent fluid, which, if not renewed by washing or by topical applications, soon hardens and forms more or less thick, yellowish, friable, and semi-transparent crusts. If undisturbed, the crusts grow thicker by constant additions of fluid from beneath. When removed, the surface beneath is found red, inflamed, shining, or excoriated, and giving issue, from numerous minute points, to a very abundant sero-purulent fluid. In long-lasting cases, the integument becomes thickened, hardened, and cracked or fissured, so as to present to the eye the appearance of a most violent and painful inflammation. When the disease tends to recovery, the crusts drop off, the discharge diminishes in quantity, so that any subsequent crusts that may be formed are thinner than the earlier ones; at last the discharge ceases, and there is left merely a red and shining surface, covered with a very delicate epidermis, which long remains in this state, to return, however, finally, to the natural condition; or, the diseased action may be revived by even slight irritations.

Throughout the course of the eruption there is much heat, tension, and evident smarting and itching at the diseased point. In young children these give rise to a great deal of suffering and irritability, and to the most violent scratching, such as to cause in many instances large excoriations, with oozing of blood.

Impetigo Sparsa.—This is quite a common eruption in children of all ages. Like the other varieties of the disease, it is most apt to occur either during the first or second dentition, and particularly the former. It differs from impetigo figurata in the arrangement of the pustules, which, instead of being confluent or grouped closely together, are discrete or distinct.

Impetigo sparsa may appear upon any part of the body, but is most frequent, according to my experience, about the face and scalp, and especially about the mouth. Some writers state that it attacks the extremities most frequently, particularly the legs, and that it usually selects the flexures of the joints. The eruption begins with small yellow pustules, seated upon an inflamed base, and attended with more or less itching. The pustules soon break and discharge a sero-purulent fluid, which hardens into a rugous, more or less projecting, friable crust, seeming to consist of different layers superimposed one upon the other. When the crusts fall, or after their removal by topical means, there remains beneath an inflamed surface, which may be either excoriated, giving issue to additional fluid and a renewal of the crusts, or dry, and disappearing little by little by the gradual fading away of the red color of the spots.

Diagnosis.—The diagnosis of impetigo is seldom attended with any difficulty. The existence of numerous small pustules, seated upon an inflamed surface, and followed by thick, yellow, matted crusts, will almost always enable us to recognize the disease with great ease. When there is any doubt a careful examination of the eruption at its outer edge, will usually reveal the primary character of the disorder, in the form of well-marked yellow pustules.

From eczema it may be easily distinguished by the presence in that disease of vesicles instead of pustules, and by the difference in the crusts, which, in eczema, are thin, scale-like, and laminar, instead of being thick, rugous, and projecting, as in impetigo. Impetigo larvalis is readily distinguished from porrigo favosa, by the facts that the pustules of the latter disease are imbedded in the epidermis, that the crusts of porrigo present a peculiar bright yellow color and are of an umbilicated or cup-like shape, and that the favose disease is followed by incurable alopecia, and is contagious, in all of which circumstances it differs entirely from impetigo.

PROGNOSIS.—Impetigo is very rarely a dangerous disease. I have never met with a fatal case in my own practice. In one instance, however, that came under my observation, of very severe impetigo larvalis combined with extensive impetigo figurata, in a child a few months old, the disease ended fatally some weeks after the child had been put under the charge of a homœopathic practitioner. But, though not dangerous, there are few diseases so distressing to the patient, and so annoying to the attendants, as a severe impetigo of the head; and, when combined with extensive impetigo figurata of the limbs and parts of the trunk, it constitutes a serious and important disorder, from the very great suffering, irritability, restlessness, and sleeplessness, which it occasions.

In the prognostic given by the physician, especially in the instance of extensive impetigo, he should never forget to refer to its probably long duration, and to its disposition to return even after an apparent cure has been made. It often lasts many months, and sometimes one or two years, or even longer.

TREATMENT.—It is well known to most physicians that it has long been supposed by many persons, both in and out of the medical profession, that the attempt to cure impetigo in children, and especially in infants, is attended with serious risk to the health, and even life, of the patient. This notion is grounded on the supposition that the cutaneous disease is an effort of nature to prevent some constitutional or inherent local disease, an idea which has been strengthened, and maintained, by the occasional occurrence of examples in which the sudden cure of impetigo is said to have been followed by dangerous and even fatal symptoms. To give the various opinions held by different writers on this point, or to discuss at length a subject upon which so much might be said, would, however, carry me much beyond my proper limits, and I shall therefore rest content with stating the conclusions to which my reading and my own experience have led me.

I believe it unsafe to procure, by the employment of external means, a very rapid desiccation and removal of an extensive impetigo, as the sudden arrestation of so large a secretion as that which is always going on from an extensive eruption of this kind, could scarcely fail to be followed by bad consequences. That consequences of this kind do sometimes occur from such an event, there can be no reasonable doubt, since it is asserted by competent observers, since it is a received opinion amongst many respectable practitioners, and since dangerous symptoms have been known to follow the sudden disappearance of other long-continued discharges. But, though I believe it to be dangerous to cause a sudden disappearance of extensive impetigo by active external means, I at the same time believe that those who entirely neglect impetigo on the ground of its being a useful and beneficial disease, and allow it to run on to any extent and for any length of time unchecked, are almost, though not quite so much in the wrong, as those who treat it with over-much activity. Any one who has watched a child laboring under impetigo larvalis and impetigo figurata of the limbs combined, and who has heard the accounts given by the mother or nurse of its sufferings, its dreadful itching, its restlessness, crying, sleeplessness, its attacks of disordered digestion, its swelled and perhaps suppurating lymphatic glands, and who will try to form to himself some idea of the torments such a child must have undergone in the months' or years' long duration of such a disease, will, I am sure, feel himself entirely justified in the attempt to remove the malady by the use of any safe means that may offer. Moreover, I am myself convinced that where the disease lasts in an aggravated form for a year or two, it must injure seriously the strength of the constitution. In one case, that came under my own observation, there remained, after the disease had lasted two years and a half, a chronic bronchitis, which had begun during the existence of the eruption, and which appears to be incurable, as it still persists, though it is ten years since the impetigo was cured. In another instance, with the history of which I am acquainted, a bronchitis set in during a most severe impetigo lasting several years, and in this case also the bronchitis has become chronic and incurable. The subject of the latter case was one of a family of three children, and whilst the other two children, who had no disease of the kind, are robust and healthy adults, the child who had suffered so long and so much with impetigo, has grown up a comparatively weak and delicate person, never without cough and abundant catarrhal expectoration.

I am therefore clearly of opinion that the impetigo of children ought to be treated, but always with care, and in such a manner as to avoid a rapid cure of extensive and confirmed cases, by external desiccating remedies. When the disease is of small extent, and when the first and most acute stage has passed by, I can imagine no objection to a careful employment of the class of remedies just alluded to. In no class of cases can I find any valid objections to the use of constitutional remedies at any period of the disease, if such are chosen as are known to be safe in themselves, and if they are used with due regard to the existing state of the patient's health.

Mild cases of impetigo, such as the impetigo sparsa and impetigo figurata, of limited extent, commonly yield readily to treatment. The application of a soft bland poultice for a few hours every day, or of some emollient decoction, as that of slippery-elm bark, marsh-mallow root, sassafras pith, or bran-water, or the use of warm chamomile infusion, on compresses covered with oiled silk, in order to remove the scabs, and after this, the use of some of the alterative or soothing ointments or lotions, will almost always effect a cure in the course of several days or a few weeks. Amongst the remedies I have found most efficacious after the removal of the crusts, is an ointment composed as follows:

℞.—Glycerinæ, ... ʒss.
Ungt. hydrarg. nitrat., ... ʒiss.
Cerat. simp., ... ʒii.—M.
To be applied twice or three times a day.

Or, the citrine ointment may be used pure or nearly pure, when the case is somewhat chronic and obstinate. An ointment consisting of one part of flowers of sulphur rubbed up with two or three parts of fresh and sweet butter, is also a very good one. When these fail, and also when there is much oozing from the eruptive surface, the Turner's cerate, or the ungt. zinci oxid., will often prove useful. Lotions of weak lead-water, of diluted chloride of soda wash, or a very weak corrosive sublimate solution, may, if necessary, be substituted for the ointments, when the latter fail or seem to irritate.

The treatment of impetigo larvalis must depend upon the stage and extent of the disease, and upon the state of health of the child at the time. In an acute, and especially in a very extensive eruption which is discharging copiously, it is not proper, as already stated, to attempt a sudden cure by means of irritating or drying external applications. When, on the contrary, the eruption is confined to a small surface, and when not very acute and rapid in its progress, we may safely employ remedies intended to arrest it, and amongst the best of these are the lotion recommended for eczema, consisting of one part of acetic acid nearly saturated with borax, and mixed with five or six of water; citrine ointment, either pure or diluted with one or two parts of lard; the zinc ointments; or a solution of corrosive sublimate, containing half a grain to the ounce, and applied by washing the diseased surface twice or three times a day, for several minutes each time, with a rag wet with the solution.

When impetigo is extensive, either covering the head and face alone, or extending also to the limbs, we are cut off, by the dangerous effects they are said to produce, from the use of active or drying external means. In such cases I have been accustomed, for several years past, to depend more on general than topical means, and as the remedies I usually employ are such as tend to invigorate the general health, and are in themselves safe, I have no hesitation in recommending them. The two remedies from which I have obtained the best effects are *iodide of iron* and *cod-liver oil.* The former I have generally given in combination with compound syrup of sarsaparilla, in the dose of from two to five drops diffused in from a quarter to half a teaspoonful of the compound sarsaparilla syrup three times a day, for children of one or two years of age. I have never witnessed any unpleasant effects from the iron. The syrup of sarsaparilla has sometimes acted as a purgative. If the cathartic operation be too severe, the quantity of the syrup must be diminished, or a few drops of paregoric may be given with each dose, to prevent the effect upon the bowels. The cod-liver oil has rarely failed to be of service, and in several instances, it has been the only means that has proved of any avail. My formula for administering it is as follows:

℞.—Ol. Jecoris Asell.,	℥ss.
P. G. Acaciæ,	℥ss.
Sacch. Alb.,	ʒi.
Ol. Cinnamom.,	gtt. vi.
Aquæ Cinnamom.,	℥iii.—M.

Give a teaspoonful three times a day.

It was at one time the custom, and the practice is still advocated by some, to resort to *calomel* in considerable and frequently-repeated doses, in the treatment of impetigo. I have never made use of it in this way, disliking its immediate and fearing its remote effects upon the health. When, however, the stools have been whitish or clay-colored, and when, also, they have been very offensive, I have made use of the remedy in small doses, without hesitation, and nearly always with good effect.

There is a remedy which has been highly recommended by some of the German practitioners, and particularly by Jörg, which I shall mention. It is the *viola tricolor*. Jörg (*Handbuch der Kinderkrankheiten*, p. 516) gives it in the form of infusion. The dose is as an infusion of from five to ten grains of the herb, given morning and evening. The virtues of the quantity just named may be extracted by from two drachms to half an ounce of water. To make the infusion agreeable it may be sweetened. I have used this herb myself, prepared in the form of a syrup, in three cases, but obtained no good effects whatever from it.

Purgatives are strongly recommended by some writers in the treatment of impetigo. When constipation has been present, and in hearty, vigorous children, in whom the general health has been too full and sanguine, I have made use of cathartics without hesitation, and with much advantage. But there are many cases of the disease in which remedies of this class could not fail to be injurious, as in weakly, delicate children, born of tubercular parents, and in those already laboring under diarrhœa, a disorder not at all infrequent in severe cases of the disease. When laxatives are to be given, the best are castor oil, rhubarb, sulphur, Rochelle or Epsom's salts in small doses, and occasionally blue pill, calomel, or hydrargyrum cum cretâ, in fractional doses.

I pass on next to a consideration of the *local treatment* of severe and extensive impetigo, which demands as much judgment, if not more, than the general. The number of local remedies, and combinations of remedies, recommended in the books for impetigo, is so enormous, that it is utterly impossible even to name them all within any reasonable space, and I shall refer, therefore, only to those which I have myself made trial of and found useful, or which come from such sources as entitle them to our attention. Amongst the most important are leeching, emollient applications, and certain lotions and ointments.

In healthy and well-colored subjects, in whom the inflammation accompanying the eruption is considerable, the application of a few leeches in the neighborhood of the eruption is both a reasonable and, as I have often found, a most useful practice. In children of from ten to twenty months old, I usually apply from two to three American leeches to each temple, or behind each ear. If the leeches be very large, one for each side of the head will be quite enough. The application ought to be repeated in a week or ten days, if it be found to answer well, and even a third or fourth repetition may be made if necessary.

In making use of external applications, whether of emollients, lotions, or ointments, in impetigo of the scalp, it is always necessary to prepare the head by removing the hair. When the case has already lasted some length of time, and has been neglected, so that masses of scabs have been allowed to collect and mat the hairs together, it is impossible to remove the latter effectually without first getting rid of the incrustations. This is best done by means of a thick, moist, and soft poultice, which should be inclosed in a fine linen rag, in order to prevent the matter of which the poultice may be composed, from adhering to the hairs. Over the outside of the poultice should always be placed on oiled silk covering to preserve it moist and soft. The poultice may be made of almost any unirritating material usually employed for such purposes. One of the best is that made of stale bread and water, with the addition of a little washed lard, to keep it soft. The water is preferable to milk, as the latter often sours soon after being applied. Another excellent poultice is one made of ground slippery-elm bark, mixed with a little flaxseed or Indian meal, to give it a slightly greater consistence. Each poultice may be allowed to remain on the part for three or four hours.

In some instances, especially after most of the crusts have fallen, it will be found equally serviceable, and more convenient, to use emollient decoctions instead of poultices. These may consist of decoctions of marshmallow, slippery-elm bark, bran, or flaxseed. They should be applied by means of patent lint, or soft Canton flannel, of which several thicknesses are to be thoroughly moistened, laid over the diseased part, and then covered with oiled silk. These applications may be retained upon the part for several hours at a time, or day and night for several days, as they may be found to suit the eruption.

After the crusts have been entirely removed, and the inflammatory condition diminished, by means of emollients, the latter may be dispensed with entirely or during the greater part of the day; or, they may be used only during sleep, at which time they are usually best submitted to by the child. At this stage of the disease it becomes proper also to make use of different lotions and ointments, intended to modify the action of the skin upon which the eruption is seated, or rather which have been found useful, by long experience, in promoting the cure of the disease.

The choice between lotions and ointments must depend very much upon trials made in each particular case, since it will be found that some are irritated by all—even the mildest ointments,—and bear lotions only, while in other instances, exactly the opposite occurs. Amongst the lotions, the safest and most soothing that I have employed are weak infusions of pipsissewa, American dittany, and the water-cress, which latter is often most useful in its effects; decoctions of bran, marshmallow, or slippery-elm; a very weak solution of borax containing morphia; weak lead-water; and a sulphuro-alkaline lotion, composed as follows:

℞.—Potass. Carbonat.,	ʒss.
Sulph. Sublimat.,	ʒi.
Aquæ Fluvial.,	℥viii.—M.

This is to be used on pledgets of lint wetted with it, and applied day and night, or, if such constant use prove too irritating, for a few hours only every day, or merely by washing the parts frequently with it. M. Bouchut (*Mal. des Enfants*, p. 528) recommends in the highest terms the use of Van Swietan's liquor as a lotion. He says he has often seen M. Trousseau employ it, and always with success. The formula for its preparation is as follows:

℞.—Hydrarg. Chlor. Corrosiv.,	gr. xviii.
Alcohol,	℥iii.
Aquæ Distillat.,	℥xxix.—M.

Liqua.

This is to be used by washing the head three times a day with rags wet with the solution, for a quarter of an hour each time. A sponge must not be used, lest it injure by its composition the chemical nature of the remedy. Before its use is commenced with the crusts must be removed from the eruptive surface, and the hair either cut very closely or the scalp shaved.

During the early stages of severe impetigo, while the disease is still attended with acute inflammatory symptoms, only mild ointments ought to be employed. Amongst the best of these are cucumber and carrot ointment, simple cerate or cold cream, containing some glycerine and from four to six grains of camphor to the ounce, the liniment of lime-water and sweet oil, Goulard's cerate, pure or reduced by lard or simple cerate, oxide of lead or calamine ointment, the benzoated zinc ointment, or the following ointment, somewhat altered from one recommended by Wilson for herpes:

℞.—Glycerinæ,	ʒss.
Liq. Plumb. Subacetat. Dil.,	ʒi.
Ungt. Flor. Sambuci,	℥i.—M.

Fresh and sweet cocoa-butter, when it can be obtained, will often be found a most soothing application. It is well, as a general rule, to soften it a little by rubbing up with it some glycerine or oil of sweet almonds.

After the inflammation has been diminished by treatment or by time, and also in the earlier stages of the disease, it becomes necessary to make use of more stimulating ointments than those just named. Of such, some of the best are citrine ointment, pure or reduced with lard and glycerine, and the following ointment, recommended by Rilliet and Barthez as successful in their hands:

℞.—Vini Opii,	ʒss.
Picis Liquid.,	℈viss.
Axungiæ,	℥i.—M.

Other ointments of this kind are one containing a drachm of calomel to an ounce of lard, with or without a few grains of camphor, the creasote ointment, and ointment of the sulphuret of potassium.

Dr. Neligan, of Dublin (*Dublin Quart. Journ. Med. Science*, vol. vi, p. 44), who seems to have been very successful in the management of impetigo of the scalp in children, treats it in the following manner. He first removes the scabs, when they are abundant, by means of poultices, and then cuts *close*, with a pair of sharp scissors, the hair. He never shaves the head, as he has found the operation too irritating. He then uses a lotion and ointment containing carbonate of soda. The ointment contains from a scruple to half a drachm of the carbonate to an ounce of prepared lard, and is lightly smeared over the eruption three times a day, and washed off every morning with the lotion, consisting of from half a drachm to a drachm of the soda in a pint of rose-water or distilled water. The weaker forms of the lotion and ointment are always used when the eruption is attended with much inflammation, while their strength is increased as the inflammatory symptoms subside. The head is always washed with the lotion, and never with soap and water, as the irritating quality of soap tends to retard the cure. In cases where greasy applications disagree, and this can be ascertained only by trial, the lotion is the only external application made use of, and it is then applied five or six times daily.

In chronic forms of the disease he states that the application of some mild stimulant to the scalp becomes necessary. The one that he has found most useful is a very dilute citrine ointment,—from half a drachm to a drachm of the officinal ointment, to an ounce of prepared lard. This is applied but once daily, at bedtime, and washed off in the morning with the alkaline lotion, which latter is used also three or four times during the day.

In the treatment of inflammatory impetigo he employs an alterative medicine, the yellow iodide of mercury, in combination with hydrargyrum cum cretâ and aromatic powder. At three years old he gives a quarter of a grain of the iodide, one grain of the hydrargyrum cum cretâ, and one grain of aromatic powder, twice a week. In infants at the breast, he omits the iodide of mercury, and gives either the hydrargyrum cum cretâ or the hydrargyrum cum magnesia, preferring the latter usually, as a more certain mild purgative than the former.

In all cases he keeps "the child strictly on milk diet during the entire of the treatment."

Mr. Wilson employs the same treatment as that which he recommends for eczema infantile, a full account of which has already been given in the article on eczema. The treatment is calomel, Fowler's solution with wine of iron, and the "constant and efficient application of the benzoated zinc ointment with spirits of wine. These means, properly used, I have never known to fail, and I believe never can fail."

CHAPTER V.

PAPULES.

ARTICLE I.

STROPHULUS.

THIS is a form of papular eruption which some writers regard as a variety of lichen, giving to it the name of *lichen strophulus*. It, however, differs somewhat in its characters from the lichen of the adult, and as it is peculiar to children, it deserves a separate consideration.

Strophulus is a disease affecting chiefly infants at the breast, characterized by a more or less extensive, and sometimes a general eruption of papules, which are whiter or redder than the surrounding skin, and are accompanied by more or less irritation and itching.

Its causes are various disturbances of the digestive apparatus in very young infants, and in older ones the effort of the first dentition.

Varieties and Symptoms.—The *strophulus intertinctus*, or *red gum*, consists of an eruption of prominent pimples of a vivid red color, scattered here and there over different parts or the whole of the body, and intermingled with small erythematous patches. The eruption remains upon the skin for some time, the papules disappearing and reappearing in successive crops, for a week or two, or more, until they terminate by desquamation. It is most common upon the cheeks, backs of the hands, and forearms.

In *strophulus confertus*, the papules are much smaller, more closely aggregated, much more numerous, and more confluent, than in the first variety, and they constitute a more severe eruption. It may be distributed over the whole surface, but is more commonly limited to a single spot, or to several regions, as the face, breast, or arms. The eruption is less vivid, but more lasting than that of the strophulus intertinctus, and usually reaches its height in twelve or fourteen days, and then subsides.

In *strophulus volaticus*, the papules, which are of a vivid color, are disposed in small, not very numerous, circular groups, scattered over the surface of the body, but met with most frequently on the cheeks and arms.

The two remaining varieties, *strophulus albidus* or *white gum*, and *strophulus candidus*, are both characterized by whitish instead of red papules. In the former, the papules are white, minute in size, and surrounded each by an areola of a faint red color; they appear usually on the face, neck, and breast, and continue for some length of time. In the latter, the papules are much larger, broader, more hard and tense, and are unaccompanied by any redness. They last usually about a week. This eruption is most common during dentition.

Diagnosis.—There is no difficulty in distinguishing strophulus, as it is the only papular eruption to which infants are subject. The absence of general symptoms and the extreme mildness of the disease are amongst its chief characters.

Prognosis.—The eruption is never attended with any danger. If severe symptoms happen to coincide with it, they must depend on some other causes than the cutaneous affection.

Treatment.—As a general rule, strophulus needs no treatment whatever. In infants within the month, the irritation of the skin, if it be such as to disturb the comfort of the child, may be allayed by the use of the tepid bath, and by dusting with some mild powder, or by anointing with cold cream, glycerine and cold cream, simple cerate, or cocoa-butter. When any marked disturbance of the digestive apparatus is present, this should be attended to.

In older children, in whom the disease appears to be associated with dentition, the local means spoken of above may be employed, while at the same time the gums should be lanced, if necessary, and any gastro-intestinal disturbance removed by appropriate treatment.

ARTICLE II

LICHEN.

In children the lichenoid eruption takes so constantly the form of strophulus, that I deem it unnecessary to give a separate description of the former disease, with the exception of one of its varieties, the lichen tropicus. No doubt cases of lichen simplex do occasionally occur in children as they approach the age of adolescence, but since the disease resembles so closely in its characters, and requires the same treatment as strophulus, what has been said in regard to that disease will perfectly well apply also to lichen. Of lichen agrius, a not uncommon and severe form of the eruption in adults, I have never seen an example in a child.

Lichen Tropicus or Prickly Heat.—This is a form of lichen simplex which occurs principally in hot climates, and during the hot summer season of the more southern temperate climates. It is a very common eruption at all ages of childhood, from early infancy upwards, in this city, and in most of our Middle and Southern States, and is commonly known by the name of prickly heat.

The chief *cause* of lichen tropicus is apparently the action upon the cutaneous surface of a high temperature, aided, no doubt, by the disturbances of the digestive function so apt to occur under the influence of that condition of the atmosphere. Very warm clothing, and particularly the presence upon the skin of thick rough flannels, is apt to develop the eruption.

Symptoms.—The eruption of prickly heat consists of numerous small papulæ, few of them being larger than a pin's head, scattered more or less thickly over the affected surface. The pimples are of a red color, which is more or less bright in tint, according to the extent and intensity of the eruption. The skin between the papules retains its natural appearance when the eruption is but slight or moderate, but when this is copious and severe, it assumes a faint reddish appearance, owing no doubt to the activity of the circulation in the part.

The eruption is most abundant on the parts covered by the dress, or rubbed by the edges of the dress, particularly about the neck, upper part of the chest, and on the arms and legs. I have sometimes seen it covering the greater part of the body. It is always attended with more or less itching, burning, and pricking, which, in older children, cause much fretfulness and scratching, and in those who are younger, restlessness, worrying, and more or less disturbance of the sleep. The disorder usually remains stationary for several days, and then disappears gradually without desquamation or other change in the skin; or, it subsides and increases, or disappears and returns, with the rising and falling of the temperature, or without any very evident cause, until at last it ceases, not to appear again. When the eruption lasts many days, it is almost always accompanied by a slight scaly desquamation of the tops of the pimples.

The *diagnosis* of this form of eruption is never difficult. Its occurrence during hot weather, the character of the papules, their minuteness and abundance, and the entire absence of constitutional disturbance, will always render it easy of recognition.

TREATMENT.—Lichen tropicus is usually regarded as a salutary eruption, and as not therefore to be interfered with by treatment likely to repel it. In fact, it never needs any treatment, except when very abundant, and when it annoys the child by the heat and itching it occasions. Under these circumstances, the skin should be dusted with rye-meal, or anointed two or three times a day with some mild ointment, as, for instance, one consisting of glycerine and cold cream or lard, or the benzoated zinc ointment; or, the child may be bathed once or twice a day in warm water containing bran, slippery-elm, or some other mucilaginous substance.

ARTICLE III.

PRURIGO.

DEFINITION; FREQUENCY.—Prurigo is characterized by an eruption, more or less extensive, of isolated papules, which, larger than those of strophulus, unattended with any change in the color of the skin, and developed usually on the extensor surfaces of the limbs, give rise to the most violent and distressing itching, a symptom which constitutes one of the most marked features of the disease.

Prurigo is a rare disease in this city amongst the children of the middle and upper classes, since I have seldom met with it. In Europe it is described as occurring in the children of the poor, though it is much less common than the eruptive diseases already treated of. Doubtless it occurs in this country also, but I have not found any original account of it in the works of American writers.

CAUSES.—The only well-ascertained causes of the disease are the unfavorable hygienic conditions which exist amongst the destitute classes of society,—damp and ill-ventilated dwellings, unwholesome food, especially the use of salted meats and fish, and want of cleanliness as to person and clothes.

SYMPTOMS.—The papules of prurigo are small, but slightly prominent, and attended with moderate itching, constituting the *prurigo mitis;* or they are larger, more projecting, and attended with the most violent pruritus, forming the *prurigo formicans*. The papules are usually of the color of the skin, except when they have been torn by the nails, and are generally seated upon the outer surfaces of the limbs, and the upper part of the trunk.

When the itching is severe, the tearing of the papules by the nails causes the escape of a small drop of blood from the tops of many of them. The blood dries and forms so many small black crusts crowning the summits of the papules, a peculiarity which constitutes one of the most distinctive features of the disease. The papules terminate by absorption or by a slight desquamation.

The *duration* of the eruption is very uncertain. In acute cases, when properly treated, it may end in a few weeks, though it often, and indeed more generally, lasts for several months.

DIAGNOSIS.—The only diseases with which prurigo is likely to be confounded are strophulus or lichen. It may be distinguished, however, generally with ease, by the facts that the papules of prurigo are larger, less numerous, and more extended, than those of strophulus or lichen; that in the latter diseases the papules are never crowned by the small black crusts of prurigo, and they are never attended with the same violent itching as the former.

PROGNOSIS.—Prurigo is never perhaps a dangerous disease, though usually a very troublesome one from the severe irritation which attends it, from its not unfrequently obstinate resistance to treatment, and its disposition to relapse.

TREATMENT.—The internal treatment of prurigo in children should consist in the use of sulphur, given alone or in combination with magnesia, of demulcent drinks, of mild laxatives when there is constipation, and of such remedies as may be rendered necessary by any disordered state of the digestive function. The diet must be carefully regulated. It ought to be nourishing and sustaining, but at the same time light and of easy digestion.

In addition to the internal treatment, simple warm-water baths, or emollient baths of flaxseed, bran, slippery-elm, or marsh-mallow, should be made use of in the early stage of the disorder. At a later period, alkaline baths, containing from three to eight ounces of carbonate of potash to each bath, according to the age, are recommended by Cazenave and Schedel. To allay the cutaneous irritation mild ointments are often found useful. Billard employed with success, in a child six months old, inunctions with the oil of sweet almonds. When the case is obstinate,—resisting emollient and alkaline baths, sulphurous baths must be made use of.

CHAPTER VI.

SQUAMÆ.

THE four species of scaly diseases, lepra, psoriasis, pityriasis, and ichthyosis, are so much more rare in children, and therefore so much less important practically, than the various eruptions we have thus far considered, that I deem it unnecessary, in a work limited in extent like this, to attempt a detailed account of them. I shall make merely a few observations on each, referring the reader, should he desire further information, to the work of Cazenave and Schedel, or to that of Wilson.

LEPRA is said by Billard, Baron, and Rayer, never to occur in children at the breast, though it occurs not very rarely after the first dentition. It cannot be by any means frequent, however, at any age of childhood, since I have never met with an instance of it.

PSORIASIS is a more common disease in children than lepra, so much so indeed, that Willan describes a variety of it under the title of psoriasis infantilis. The only case that I ever met with was a very mild one in a child nine years old. It is met with in two forms, the *psoriasis diffusa* and *guttata*, of which the former is said to be the more frequent.

Psoriasis diffusa appears in the form of patches of rather large, but very variable size, of irregular shape, and covered with thin scales of dried epidermis, which are constantly falling off and being renewed. When the scales are removed the surface of the eruptive patch is seen to be of a dull red color, somewhat rough, and raised above the surrounding skin. In severe cases, as the disease occasionally occurs in young children, the skin presents numerous chaps and fissures, and is often excoriated more or less by the dress, or by the neighboring surfaces. From the excoriations is sometimes poured out an unhealthy secretion, which hardens and forms scabs.

Psoriasis guttata appears in small, reddish, and rounded elevations, more elevated at the centre than circumference, and of different sizes; from that of the head of a pin, as mentioned by Billard, to that of a large pea, as seen by myself, and which become covered very soon after their appearance with fine, minute, and whitish scales.

A third variety, *psoriasis inveterata*, a severe, obstinate, and inveterate disease, as met with in adults, is very rare, if not unknown, in children.

TREATMENT.—In recent cases psoriasis is to be treated with simple warm water or emollient baths, and with mild liniments or ointments, such as oil of sweet almonds, glycerine alone, or glycerine mixed with cold cream or simple cerate. In more chronic cases the condition of the skin must be modified by means of weak alkaline or sulphurous lotions or baths, and by ointments whose action upon the skin is of the same kind. M. Berton recommends highly tar ointment containing one part of tar to four of lard, which he states has been used very successfully by M. Emery.

In all cases the digestive function must be carefully attended to, any disorder that it may present being removed as rapidly and effectually as possible by the proper remedies.

The active alterant substances, so much used in the psoriasis of adults, and particularly arsenic and cantharides, should not be employed for children when they can be avoided, and if employed should be given in very small doses.

PITYRIASIS is a slight scaly disease which may attack the head only or extend to other parts of the body. In children, however, it is generally confined to the scalp, and may be recognized by the existence on the part of innumerable small, thin, whitish, furfuraceous scales, which form a thin or thicker covering for the scalp, in proportion to the amount of care bestowed on the cleansing of the head. The scales of epidermis are easily rubbed off, and the surface beneath is rarely found to present even the slightest inflammation.

It is a disorder of minor importance, and seldom requires other treatment than some mild lotion or ointment, and strict cleanliness.

ICHTHYOSIS is an eruptive disease in which there appears on various parts, and usually over the larger portion, of the skin, epidermic patches or squamæ, that are hard and dry, and of more or less considerable size. The patches are generally of a dirty gray or earthy color; they exfoliate, and leave the skin beneath a little thickened and roughened, but never inflamed. The disease is unattended with either heat, pain, or itching. It is ordinarily congenital, lasts many years, and, according to MM. Cazenave and Schedel, is incurable.

Billard recommends, however, in the ichthyosis of new-born children, the use of warm and emollient baths, frictions with oil of sweet almonds or olive oil, acidulated drinks, and perfect cleanliness.

CHAPTER VII.

DISEASES OF THE SKIN NOT CLASSIFIED AMONGST THE PRECEDING.

ARTICLE I.

FAVUS.

FAVUS is a peculiar disease of the scalp, long confounded by different writers with other and very dissimilar affections of that part. In consequence of this confusion it has received a great variety of names, of which the most generally known are porrigo and tinea. In adopting the above title I follow the example of Erasmus Wilson, amongst the English, and of MM. Rilliet and Barthez, Gibert and Rayer, amongst the French.

DEFINITION; SYNONYMES; VARIETIES; FREQUENCY.—Favus is a specific contagious eruption of the scalp, depending upon inflammation of the hair-follicles. It is characterized at first by small yellow pustules, countersunk in the skin; these are soon converted into yellow cup-like crusts, which adhere often for a very long period. It usually causes permanent loss of hair at the affected part.

The disease is described by most of the English writers under the title of porrigo, but as several other eruptions have been included under the same name, I think it best to follow the example of Mr. E. Wilson, and call it Favus. By MM. Biett and Cazenave it is designated, after Willan, porrigo favosa and porrigo scutulata. MM. Rayer and Gibert, as above mentioned, give it the name of favus.

There are two varieties of favus, the *favus dispersus*, the porrigo favosa of most writers, and the *favus confertus*, the porrigo scutulata of many observers.

The disease is much less frequent than impetigo and eczema of the scalp, but is nevertheless constantly met with amongst the crowded populations of Europe. In Paris I saw it on several different occasions. In this country it is more rare, and amongst the middle and upper classes, at least of this city, is almost unknown, since I have never met with a case of it in my own practice.

CAUSES.—The only well-ascertained exciting cause of favus is generally thought to be *contagion*, a quality of the disease acknowledged by most observers, though denied by Mr. E. Wilson. It may be propagated by direct contact of the diseased with a healthy skin, or by means of combs, brushes, or other articles of the toilet. It has been twice propagated by direct inoculation,—once by Remak, and once by Bennett.

It occurs at all seasons, attacks either sex indifferently, and is met with at all ages, but is especially frequent in children and young people. Certain conditions act as predisposing causes in its production, and may alone, perhaps, give rise to its development. These conditions are unhealthy hygienic influences, as unwholesome and insufficient food, poverty, filth, and the living in low, damp, and ill-ventilated dwellings. It is met with most frequently in persons of feeble, lymphatic, and especially in those of scrofulous constitution, though, be it remarked, it occurs also in persons of strong and vigorous health.

SYMPTOMS.—FAVUS DISPERSUS, OR PORRIGO FAVOSA. This variety begins with very small pustules of a peculiar straw-yellow color, which exhibit from the first the special character of not being raised at all above the level of the skin. Directly after their formation, the yellowish matter which they contain begins to concrete, and there can be perceived from this early period a central depression in the crusts, which becomes more marked as these augment in size, so that at the end of five or six days it is perfectly evident. Each pustule, and of course each crust is, as a general rule, traversed by a hair. The favous crust is a very remarkable feature of the disease, and is in itself a pathognomonic symptom. As it increases in size, which it does gradually until it reaches in some instances a diameter of half an inch, the central depression above spoken of becomes more and more distinct, and the crust assumes, from this circumstance, the shape of a cup with an inverted edge. This cup-like form, the peculiar straw-yellow color, and the fact that each crust is usually pierced by a hair, are the distinguishing characters of the disease.

The pustules are usually isolated at first, though they may be arranged in groups of irregular size. When numerous, the crusts, by their gradual enlargement, touch at their edges, and blend into larger or smaller patches of irregular shape, but still presenting many little depressions corresponding to the first-formed pustules. In rare cases, the disease is so extensive as to form a kind of mask covering the whole scalp.

When the disease is not interfered with by treatment, the crusts remain adherent for a long time,—for months or even years; they become also paler in color than they were at first, and so dry and pulverulent, as to break very readily when rubbed or touched. They become, moreover, thicker and more massive, and lose their first regular cup-like form, from the disappearance of their depressions, and from the irregular and uneven shape given to their edges and surfaces, by the breaking which they undergo. When the case runs on in this way, the head exhales a most unpleasant odor, which has been compared to that of the urine of a cat. In some instances, where the disease is grossly neglected amongst the very poor, pediculi form in abundance amidst the crusts, and add to the disgusting appearance of the disorder.

When the crusts have been removed by any means, the surface of the scalp is seen to be red, moist, and to present slight erosions or even ulcerations. The crusts are re-formed only by the eruption of new pustules.

An invariable and unfortunate sequel to the favous disease is a more or less extensive loss of the hair. The hairs become loose from a very early period of the disease, and can be pulled out with great ease. As the case goes on they fall out, and the scalp is left smooth, shining, uneven, and deprived of hair. On these spots the hair seldom grows again, and if it does, it comes out thin, woolly, and with every appearance of weakness and unhealthfulness.

Though the usual and favorite seat of favus is the scalp, it is met with occasionally on the forehead, temples, chin, and eyebrows, and, in still rarer instances, on the shoulders, elbows, forearms, on the upper and outer parts of the legs and thighs, and on the scrotum. Even in such cases, however, it has generally existed first on the scalp, and extended thence to the other parts, though it may sometimes begin upon the trunk or limbs in consequence of a direct application to them of the contagious element.

FAVUS CONFERTUS OR PORRIGO SCUTULATA.—In this variety of favus the pustules are arranged so as to form circles or rings upon the forehead or scalp, instead of being dispersed irregularly over the scalp, as in the preceding variety. The disease begins with red, circular patches, attended with a good deal of itching, upon which, after a short time, appear small yellow pustules, that seem to be sunken in the skin. The pustules are more numerous on the circumference than at the centre of the red patch or disk; or the latter increases in size by the extension of the disease to the follicles just beyond its outer edge. The pustules are exactly like those of favus dispersus, except that their yellow color is of a lighter tint. They desiccate very rapidly, and form crusts which are very thin at first, never very thick, and of an irregular shape.

When the disks are very numerous, either originally, or by propagation of the disease from part to part, they meet at their borders, blend together, and give to the scalp the appearance of an extensive and irregular crust, presenting at its circumference curved lines, marking the segments of circles of which the whole is composed. The crust has sometimes covered the whole scalp, excepting merely a small border at its circumference, where may still exist some scanty remains of the hair.

When the crusts are removed the surface beneath is found to be red and tumid, according to Wilson, and to present numerous yellow points. Cazenave and Schedel state that when the crusts fall, they leave exposed a large, uneven, furfuraceous patch, upon which new favous pustules do not appear for a long time often. The hair is in great measure destroyed over the diseased surfaces, though not so completely, it is said, as in the other variety.

Favus is not, in either variety, attended with constitutional symptoms. The only marked local symptom complained of is the itching, which is always greatly aggravated by want of cleanliness.

NATURE OF FAVUS.—There has been and there still is much difference of opinion amongst observers as to the nature of favus, some supposing it to be a disease of the sebaceous glands of the scalp, some of the hair follicles, while others, particularly some of the most recent observers, assert that it is an organic growth,—a vegetable fungus or parasitic plant. The latter opinion, first put forth by Remak, has been strongly maintained since by Schoenlein, Gruby, Hughes Bennett, Lebert, Vogel, Robin, C. Neligan, and others, whilst it is opposed by Cazenave, Wilson, and a few others. To attempt an accurate description of the microscopic appearances of the supposed parasitic plant, or to notice the arguments for and against its existence, would require more space than I can devote to it, and I must therefore refer the reader to the work of M. Lebert (*Physiologie Pathologique*, tome ii, p. 477), or to that of Mr. E. Wilson, on Diseases of the Skin. I will merely state that the arguments brought forward in support of the opinion as to the cryptogamic nature of the disease are to me very convincing. The following imperfect sketch of the microscopic appearances of the supposed plant, will suffice to give some idea of its nature to those who have not time nor opportunity for a more thorough study of the subject. It is taken from M. Lebert's work.

M. Lebert states that the favus itself is a substance entirely foreign to the skin, and that it has no resemblance to the favous pustule, with which it has been until lately confounded. The favus above alluded to is the peculiar yellow, dry, smooth, brittle, and cupped crust, mentioned in the description of the symptoms of the disease. The surface of this body is composed of an envelopment-membrane of a sulphur-yellow color, in which the microscope shows a homogeneous and finely punctuated substance. The interior, of a pale white color, is porous, and formed of grumous particles consisting of sporules, and of simple or ramifying branches. The sporules, which occupy much the larger part of the interior of the receptacles, are of a rounded or more frequently of an oval form, and have well-marked edges, and a homogeneous and slightly opalescent interior. The diameter of the most recent is $\frac{5}{100}$ths of a millimetre. Many of these sporules are seen to be grouped together, while some are more elongated, and present a contraction in the middle; others are nearly triangular in form, with rounded angles; others, yet more elongated, are marked with several contortions; while some again are composed of confluent sporules that have ended by forming branches, the intersected walls of which show the primitive separation of the globules. These branches may exhibit at a later period ramifications, which resemble sometimes in their arrangement the conjugated branches of lygnæma; other branches, ramified or simple, contain minute granules; in addition to the branches of $\frac{5}{100}$ths of a millimetre in diameter, some very delicate ones of scarcely $\frac{25}{1000}$ths are seen. Amongst the branches and sporules may be perceived a considerable number of molecular granules of the diameter of from $\frac{1}{100}$th to $\frac{2}{100}$ths of a millimetre, which are probably imperfectly developed sporules. Some sporules, completely formed, seem to have a double envelopment-membrane, and others present in their interior something like a nucleus.

DIAGNOSIS.—The diagnosis of favus rarely presents any difficulties. The peculiar pustules which exist at first,—small, yellow, on a level with or below the surface of the scalp, and the crusts which so soon follow these, saffron-yellow in color, dry, and cup-shaped, will mark a case of favus dispersus from every other disease. In favus confertus the same characters exist, but the crusts and pustules are arranged on circular erythematous disks, instead of being isolated or dispersed as in favus dispersus.

From impetigo of the scalp, which is the only disease with which it is at all probable that it would be confounded, it may readily be distinguished by an examination of the primary characters of the two disorders. This primary character can always be found by searching at the outer edges of the diseased surface. In favus the pustule is small, depressed, and contains very little fluid, while in impetigo it is large, globular, and projecting. The crusts are very different:—in the former dry, as though dusted with sulphur, cup-shaped, depressed, and usually traversed by a hair; in the latter, rugous, irregular in shape, not cupped, resting above the skin, and generally somewhat moist and soft. Lastly, the alopecia which so constantly results from favus, does not occur in impetigo.

Prognosis.—Favus is a serious disease because of its usually long duration, the difficulty often experienced in effecting its cure, and because of the loss of hair which it occasions.

Treatment.—The treatment of favus should be both general and local, for though some writers, and particularly Cazenave and Schedel, state that it must be altogether external, and that in spite of numerous trials they do not feel authorized to propose any internal means (*Malad. de la Peau*, 4ème ed. p. 326) others, as Wilson, Bennett, and Neligan, recommend constitutional remedies as of very great importance in assisting the cure.

The *general* treatment must be such as may seem called for by the state of health of the individual patient. When, as so often happens, the disease occurs in a scrofulous person, cod-liver oil, iodide of potassium, nourishing food, air, and exercise, are of the utmost importance. When the health of the patient is feeble and broken from the want of wholesome and abundant food, from insufficient clothing, or from residence in a vitiated, close, and confined air, the removal of these conditions, which undoubtedly act as predisposing causes in the production of the disease, cannot but aid in its cure. Dr. Neligan (*Dublin Quart. Journ. of Med. Sci.* vol. vi, p. 56) recommends very highly the use of the iodide of arsenic as a constitutional remedy. He states that it may be given with the greatest safety to the youngest child, "its effects being, of course, duly watched." The dose for a child six years old is one-fifteenth of a grain, and for a younger one, from one-eighteenth to one-twentieth of a grain, three times a day. Dr. Neligan speaks, however (*Loc. cit.* p. 62), of substituting the yellow iodide of mercury for the iodide of arsenic in the case of a child three years and a half old, being afraid to give the latter to so young a child. He nevertheless gave this remedy afterwards in the case referred to, but in the dose only of the twenty-fourth of a grain every morning. It is given to children in the state of powder mixed with sugar or aromatic powder, and produces, when the system is saturated with it, some constitutional symptoms, as acute headache, dryness of the throat, etc. He has given it, however, in some cases, in full doses for several weeks without any manifestation of its effects, further than those produced upon the disease. When it does give rise to constitutional symptoms its use is to be intermitted for some days, and an active purgative administered.

The *local* treatment of favus is undoubtedly that upon which we must chiefly rely, since without it it is questionable whether the disease ever gets well. Moreover, all writers and persons of much experience agree in the high estimate they make of the importance of this part of the treatment.

The first and most essential step in the local treatment is to insist upon thorough cleanliness of the diseased part. The hair should be cut short or shaved. As shaving the hair is difficult and often painful, cutting it short with sharp scissors is generally preferable. The crusts must then be removed. Some recommend for this purpose poultices, but these are condemned by Wilson, as clumsy, and by Lebert as causing the extension of the disease by the softened sporules which spread to the surrounding surfaces and propagate the disorder. Wilson recommends their removal by means of a local vapor-bath, applied through the medium of a caoutchouc cap, or, if this is not at hand, by laying a piece of folded lint, wetted in a solution of subcarbonate of soda or potash, upon the head, and covering it with an oiled silk or gum elastic cap, which should include the entire scalp. M. Lebert insists upon the necessity of removing the favi (not the pustular crusts which accompany the specific vegetable growth), in their dry state, by means of small spatulas, needles, or some kind of instrument. The epidermis is readily detached from around the favus, and this latter, which adheres but slightly to the skin, is then easily removed. M. Lebert states that this is so easily done, that he has been able to teach his ward-attendants to remove them without pain to the patients.

After the crusts have been gotten rid of, the scalp should be well washed morning and evening, with soap and water, in order to remove any favous sporules that may have escaped, and then carefully combed, to remove any hairs loosened by the disease, as these have been found to act as irritants to the diseased scalp. The cleansing of the scalp with soap and water daily, and the subsequent removal of the loosened hairs, ought to be continued throughout the whole duration of the disease. Attention to these points is said, by all writers, to be of the utmost importance, and to go very far towards curing the disease. But not only do they act beneficially in themselves, they procure also a clean and uncovered surface, to which the local remedies that may be necessary can be applied directly and with the greater effectiveness.

As soon as a clean surface has been obtained, some application intended to destroy the vitality of the vegetable growth, ought to be made use of. One of the best for this purpose is a solution of corrosive sublimate, the strength of which, according to Lebert, ought to be, when employed in lotion, from two to four grains to the ounce, and when used as a fomentation weaker. Dr. Bennett (*Ranking's Half-Yearly Abstract*, No. xii, 1850, Am. ed. p. 73), employs, to fulfil this indication, cod-liver oil. The head is kept constantly smeared with the oil, and covered with an oiled silk cap.

There are various other remedies that have been applied to the diseased scalp empirically, either to "modify the state of the skin," to "excite the disordered follicles to healthy action," or, lastly, to "destroy the vitality of the fungus, and, by altering the nature of the soil on which it flourished, to prevent its reproduction." Without attempting to define the mode in which any of these various substances may produce their effect, I deem it best to mention as succinctly as possible those which have the strongest testimony in their favor.

Mr. E. Wilson is less favorable to strong applications than he was formerly. Those he now prefers are the ceratum tiglii, containing from ten to thirty drops of the oil to the ounce; the unguentum hydrargyri nitratis, diluted one-half; the unguentum hydrargyri nitrico-oxydi, diluted in similar proportion; the compound sulphur ointment, and some others.

Dr. Bennett's application of cod-liver oil has been referred to above. This, in connection with the constitutional treatment for scrofula, is said to have cured, on an average, in six weeks.

MM. Cazenave and Schedel recommend alkaline and sulphurous applications, and acidulated lotions. They speak very favorably of, and give much the highest place, amongst the substances to be used in friction, to the iodide of sulphur. This remedy was originally made use of by Biett, and employed by him with much success. Its efficacy is attested also by Lebert. It is used in the form of an ointment, consisting of from a scruple to half a drachm of the drug to an ounce of lard, and is to be applied morning and evening to the diseased surfaces by gentle friction.

Dr. Neligan (*Loc. cit.*) puts the patient upon the constitutional treatment before described, and makes use of the following local treatment. The hair is cut, *not shaved*, and a linseed-meal poultice applied and kept on for twelve hours, so as to soften the crusts. As soon as the poultice is removed, the head is well washed with a carbonate of potash lotion (ʒi to Oj of distilled water), and slightly brushed with a soft hair-brush or roll of lint; the scalp is then covered with the carbonate of potash ointment (grs. xx, to ʒss to lard ℥i) spread on lint, and over it a closely-fitting oil-silk cap is placed; the ointment is renewed twice daily. By these means the crusts are generally removed in two or three days. At the end of this time, the carbonate of potash ointment is replaced by one containing the iodide of lead (ʒss to lard ℥i); the head is still to be washed with the carbonate of potash lotion. When the iodide of lead causes inflammation of the scalp, as sometimes happens after the first few days, it should be intermitted for a day or two, and the lotion employed alone three or four times daily. After this first attack of inflammation disappears, Dr. Neligan has not seen it recur again, although the use of the ointment has been persisted in for months. The strength of the ointment is to be increased after a fortnight, if the disease appear again, even to double that mentioned above. After continuing this treatment for at least three weeks or a month, all external applications should be stopped, and the hair allowed to grow, so as to ascertain if the fungus will be reproduced. Should it appear again, the local applications must be had recourse to as before. The iodide of arsenic is to be continued until we are quite satisfied that the cure is complete. During the whole of this treatment, the patient is to be kept on a milk diet.

ARTICLE II.

TRICHOSIS FURFURACEA OR RINGWORM OF THE SCALP.

DEFINITION; SYNONYMES; FREQUENCY.—Ringworm of the scalp is a disease about which much discussion has been had lately. It begins with more or less numerous patches of a circular or oval shape, which, after having presented for a short time, according to some, minute vesicles, become the seat of a fine furfuraceous desquamation. The disease always affects the growth of the hair, giving to the latter a sickly appearance, and causing a temporary alopecia. It is contagious.

This disease is known also by the names of porrigo furfuracea, and porrigo scutulata, having been confounded by some writers, under the latter title, with true porrigo scutulata or favus dispersus. By Cazenave it has been called herpes tonsurans; by Neligan it is called herpes capitis; and by Wilson, trichosis furfuracea.

It is a frequent disease in England, but a rare one in France; it is not uncommon in this city, as I have met with thirteen cases of it.

CAUSES.—This disease appears to be propagated chiefly by contagion,—at least this is the only clearly ascertained cause that has been discovered. Its contagious character is positively asserted by Cazenave and by Neligan, and in the thirteen cases that came under my observation, I could have no doubt of its being extended in this manner, since they all occurred in five families, three cases in each of three of the families, and two in each of the remaining two. Moreover, in all of the families, the disease appeared first in one child and extended afterwards to the others.

Mr. Wilson believes the cause of the disease to be imperfect nutrition, "which careful examination will never fail to detect." In not one of the thirteen cases that I have seen, had I the least reason to suppose that imperfect nutrition was the cause of the eruption, since they all occurred, as it chanced, in families living in easy or very affluent circumstances, the children of which were perfectly well lodged, well clothed, and well fed, and to whom every attention required by the nicest cleanliness was given.

The disease is confined to childhood and early youth, and is most common between the ages of three and twelve years.

SYMPTOMS.—Those who regard this disease as a variety of herpes, describe as its first symptoms the appearance on the scalp of a "small ring of minute vesicles, not more than an eighth of an inch in diameter, without any redness or other mark of inflammation beyond a slight tingling,—not itching. These vesicles are attended with scarcely any discharge, they soon drying up and desquamating; but, as they dry at the centre they spread upon the circumference, and the diseased spots, in the course of a few days, attain the size of a shilling." (Neligan, *Loc. cit.* p. 33.) Mr. Wilson, on the contrary, who regards it as a disease of the hairs, makes no mention of vesicles, but describes as the leading character of the disease the formation of a thin layer of scurf, either in separate scales around single hairs, or in patches which include several or a considerable number of hairs. In the early stage, he says, nothing more is perceptible than these scales, but the diagnosis is made evident by the observation that the scurfiness is limited to particular hairs, and clusters of hairs, and that the patches corresponding with these clusters have a circular or oval form. In this early stage also, the aperture of the follicle of the diseased hair is generally more or less prominent or papillated, having the appearance of being drawn up by the growth of the hair, and resembling what is called goose-flesh, or cutis anserina. If, at this time, one of the hairs issuing from a furfuraceous patch, be gently pulled, it will probably break off near the skin or within the follicle, instead of coming up by the root as in health.

Whether the disease be vesicular or not in the early stage, it is generally acknowledged to become, very soon after its appearance, furfuraceous. For my own part, I have never been able, though I examined the cases that came under my notice with the minutest attention, to detect even a single vesicle, and I am strongly inclined, for this and other reasons, to believe that the disease is not a herpes, but as Mr. Wilson supposes, an affection of the hairs.

When once established, the disease appears in the form of furfuraceous patches usually of a circular shape, which are, at first, not more than an eighth or a quarter of an inch in size, but which increase gradually until they attain a diameter of one or two inches, and seldom more. The diseased surface is slightly thickened, elevated, and covered with fine, dry scales, which are very easily rubbed off, and quickly renewed after being removed by any cause. The only local symptom noticed by the patient is itching, and this is not often very troublesome.

At this time, also, the hairs present an appearance which is very characteristic. In the very early stage they are bent on themselves and twisted, so as not to lie smooth, and the roots are somewhat matted together by the furfuraceous scales of the disease. A little later they break off at a short distance from the diseased surface, leaving the circular patches partially deprived of hair. The broken hairs are uneven in length, and otherwise altered in appearance, being bent and twisted, and having become lighter in color than the original hairs, so as to assume somewhat the look of bundles of tow.

In ringworm of the scalp it happens occasionally that patches like those upon the head, are found upon the neck and arms, and even on other parts of the body. The patches forming upon the body present scales more minute than those seated on the scalp. The diseased patches increase from the circumference, while the centre returns to its natural state.

NATURE OF THE DISEASE.—Some writers regard this disease, as has already been stated, as one of the varieties of herpes, while others deny its vesicular nature, and conclude it to be an affection of the hairs. It appears to me, however, that the circumstances of its being contagious, the difficulty of its cure, its chronic character, and the very short duration, and even, according to some, the doubtful existence, of vesicles in the disease, make very strongly against the opinion of its herpetic nature. I am, therefore, much more disposed to adopt the idea of its being a peculiar and specific affection of the hairs themselves, but whether it be, as Wilson supposes, the result of some diseased condition of the nutrition of the hair, or whether it consists, as Gruby has advanced, in the production of a parasitic mucedinous growth, has not yet been clearly ascertained.

DIAGNOSIS.—This disease is easily distinguished from other eruptions of the scalp. The appearances it presents are utterly unlike those of favus, impetigo, or eczema. In the first of these, the peculiar cup-shaped crusts; in the second, the projecting yellow pustules or thick masses of yellow soft scabs; and in the third, the numerous minute vesicles scattered irregularly over the scalp, and followed by thin brownish-yellow scabs, or fine furfuraceous scales, through which there weeps a small amount of secretion, are entirely unlike the eruption of ringworm, which consists of more or less regularly circular patches, dry, mealy, and papillated, and producing at length a broken and tow-like condition of the hairs, and partial baldness.

PROGNOSIS.—Ringworm of the scalp is entirely devoid of danger, but it is an exceedingly troublesome disease for the patient, as it is apt to spread to other children, and as it is often very difficult of cure.

TREATMENT.—The cases of ringworm of the scalp that have come under my charge, have proved in most instances very rebellious to treatment. The remedies that have proved most useful are a sulphuro-alkaline lotion, composed of one drachm of subcarbonate of potash and two of sulphur, to a pint of water, applied by washing with a sponge several times a day, and an ointment consisting of a drachm of muriate of ammonia mixed in an ounce of sulphur ointment, applied first at night by inunction, and after a time on rags.

When, in connection with this disease, the general health of the patient is in any degree debilitated and injured, remedies of a tonic and strengthening kind ought to be prescribed. The best of these are iodide of iron in syrup of sarsaparilla, the citrate of iron and quinine, or cod-liver oil.

Mr. Wilson commences the treatment by the application of some moderately powerful stimulant, such as the acetum cantharidis, or the stronger acetic acid, which he applies once to the diseased spots. After the tenderness produced by this application has abated, he anoints the patches daily with some moderately stimulating ointment, such as the citrine ointment diluted with ceratum cetacei. Another ointment which he strongly recommends, is one composed of a drachm of sulphate of zinc to an ounce of simple cerate. During the treatment the head is to be washed once a day with soap, and when dry, anointed with pomatum. Mr. Wilson regards the keeping the scalp constantly moistened with some oleaginous matter as an important adjuvant to the cure.

M. Cazenave, unlike Wilson, condemns the use of irritating applications as injurious. The most successful treatment he has employed is the following. He rubs into the scalp every evening an ointment composed thus:

℞.—Acid. Tannici.,	℈i.
Axungiæ,	℥i.
Aquæ,.	q. s.—M.

In the morning the scalp is washed with one of the following lotions:

℞.—Potass. Carbonat.,.	ʒss. vel ℈ii.
Aquæ,	Oj.
Liqua.	

Or,

℞.—Sodæ Borat.,.	ʒss. vel ℈ii.
Aquæ,.	Oj.
Liqua.	

Two or three times a week he prescribes an alkaline bath, advising the patient to wash the head with the water of the bath.

Dr. Neligan, of Dublin, treats this affection in the same mode as impetigo of the scalp. The reader will find an account of his method in the article on impetigo. (See page 677.)

Before concluding my remarks upon this disease I wish to state that my own experience in its treatment has taught me that it is one of the most obstinate disorders to which children are subject. I once made a faithful trial of Dr. Neligan's treatment in three cases occurring in one family, and though the disease was ameliorated, it was not cured. The cases passed out of my hands after several months, and I never heard what became of them. In another case that came under my notice, acetic acid and many different stimulating ointments had been tried for a period of two years without any lasting good effect. I prescribed the muriate of ammonia and sulphur ointment, but it failed. The disorder has slowly disappeared, since then, under the persevering employment of tar ointment and vegetable diet.

CLASS VI.

WORMS IN THE ALIMENTARY CANAL.

GENERAL REMARKS.

There are five different species of worms found in the alimentary canal. These are the Ascaris lumbricoides, or round worm; Ascaris vermicularis, thread-worm, seat-worm, or, as it is popularly called, ascarides; Tricocephalus dispar, or long thread-worm; Tænia solium, common tape-worm, or long tape-worm; and the Bothriocephalus latus, tænia lata, or broad tape-worm.

I shall not attempt to discuss the question of the mode of origin of human entozoa, about which much difference of opinion still prevails, some asserting that their ova or germs are introduced from the exterior, while others, embarrassed by the difficulty of accounting for their existence in organs inclosed in shut cavities, advocate the opinion that they are the result of a spontaneous generation.

I shall give a short description of each of the intestinal entozoa, in order that they may be readily distinguished, but will treat of the causes, symptoms, and treatment only of the first two, inasmuch as the tænias very rarely exist during infancy or childhood, and the tricocephalus is much less frequent than the round and seat-worms, and gives rise to symptoms of the same kind as the former.

Description.—The *Ascaris lumbricoides*, or, as it is commonly called, lumbricoides, lumbricus, or round-worm, is shaped not unlike the common earth-worm, having a cylindrical body, which is attenuated towards either extremity, but particularly the anterior. It varies in length generally between six and twelve inches, and is usually about two or three lines in thickness. The young worm, about an inch and a half long, is rarely met with. The head of the animal is at the smallest extremity, and may be distinguished by a circular depression, around which may be seen three tubercles. When recently voided the worms are somewhat transparent, so that the viscera may sometimes be seen through the parietes. The integument is marked by circular fibres, and by four lines extending at equal distances from the head to the tail, the former of which indicate the course of the muscles, while the latter indicate that of the vessels and nerves.

The color of the worm is whitish, yellowish, or more or less deep rosy in tint, according to the nature of the aliment they contain; they are, as already stated, somewhat transparent when first voided. The alimentary canal, which may be distinguished by its brownish color, terminates by a transverse opening or anus, situated on the inferior surface of the animal, just in front of its posterior extremity.

The two sexes are in different individuals. The male may be known by its tail, which is shortly curved, while that of the female is straighter and thicker. The genitals of the male consist of a double penis, which may sometimes be seen to protrude just in front of the caudal extremity; those of the female may be distinguished by the vulva, seated at a constricted point of the body, about a third of the distance from the head to the tail. The male is smaller and much less abundant than the female.

The *Ascaris* or *Oxyuris vermicularis*, thread-worm, seat-worm, or maw-worm, is the smallest of the intestinal worms, and is generally distinguished in popular language by the title of ascarides. The sexes are in separate individuals.

The male is generally about two lines in length; its body is elastic, of a whitish color, very slender, and looks not unlike a piece of cotton thread, whence one of its names was derived. The female is larger than the male, reaching a length of four or five lines. The anterior part of the body is of the same shape in both sexes. It is obtuse, and surrounded by a transparent membrane, through which may be seen a straight tube, forming a kind of bladder, which is the œsophagus, and which terminates in a globular stomach. The head is provided with three tubercles, as in the lumbricoides. The intestinal tube in the male continues the whole length of the body, which becomes somewhat thicker towards the end, and is arranged into a spiral shape at the tail. The body of the female is shaped like that of the male as far back as the stomach, and increases in size in the first third of its length, after which it diminishes, and becomes so small at the end as to be seen with difficulty by the naked eye.

The *Tricocephalus dispar* or long thread-worm is generally about an inch and a half or two inches long, and consists, as it were, of two portions, of which the anterior, constituting about two-thirds of the length, is exceedingly slender, scarcely thicker than a horse-hair, while the posterior third swells out suddenly so as to become much thicker and larger. The sexes are in different individuals. The worm is provided with an alimentary canal, which, commencing at an orbicular mouth placed in the small extremity, runs through the animal to the anus, placed at the caudal extremity. The male is smaller than the female, and is, usually, found convoluted. This worm is met with chiefly in the cœcum and colon, particularly the former. It usually exists in very small numbers, and sometimes but a single one is found. The symptoms which it occasions are the same as those produced by the lumbricoides.

The *Tænia solium*, common or long tape-worm, as well as the Tænia lata, are of rare occurrence in children. Of 206 cases observed by M. Wavruch, only twenty-two occurred in subjects under fifteen years of age, and of them the youngest was three years and a half old. (*Bib. du Méd. Prat.* t. v, p. 626.) These worms have however been met with at an earlier age, but as they are rare, I deem it unnecessary to do more than describe their appearance, in order that the reader may be able to distinguish between them and the varieties which generally exist in children, the Ascaris lumbricoides and vermicularis. For a full account of the symptoms produced by the two varieties of the tænia, and their treatment, the reader is referred to any of the standard works on the practice of medicine.

The *Tænia solium* is usually of a whitish color, flat in form, and varying in length from five to ten feet, its ordinary length, to sixty, or even, according to the assertion of some writers, upwards of a hundred. It is uneven in shape, being thick and rounded behind, and measuring three or four lines at its widest part, while it tapers gradually towards the anterior extremity, where it becomes slender and thread-like. The head is minute in size, and flattish in shape, with a projecting papilla in the centre, furnished with a double circle of hooks, and surrounded by four cylindrical apertures, which seem to be the mouths of the animal. The body is composed of numerous segments, which are longer than broad at the posterior part of the worm, and resemble, when separated, the seeds of a gourd, and have hence been called cucurbitani. In this worm the two sexes exist in the same individual.

The *Bothriocephalus latus*, *Tænia lata*, or *broad tape-worm* is long and flat like the preceding variety, but it is generally thinner and broader, measuring from four to ten lines in breadth. It sometimes attains, like the common tape-worm, to a very great length. It is usually of a dirty-white color, and rather less opaque than the Tænia solium. It is distinguished also, says Dr. Wood, from the other tænia, by the shape of the segments, which are broader than they are long; by the form of the head, which is small, elongated, without spines, and divided into two lobes by a longitudinal fossa on each side; and by having, instead of the four mouths of the tænia, a single minute pore in the centre, between the fossæ, or else two pores, one at the extremity of each lobe.

The *frequency* of intestinal worms, and their *importance* as a cause of disease, have certainly been, and are still by many physicians, and especially by the public, very greatly exaggerated. There can be no doubt that they do, when they exist in large quantities, and particularly in certain countries, give rise to great disturbances of the digestive organs, and even occasion death; but such instances are, it seems to me, extremely rare in this city at least. I am quite sure that I have never as yet met with a case in my own experience, in which life was at all seriously endangered by their existence,—though I have seen numerous instances in which slight disorders of the digestive apparatus, and various nervous symptoms, generally of very moderate severity, have disappeared after the administration of anthelmintics, sometimes followed, and in an equal number of cases probably, not followed, by the expulsion of worms.

To show the truth of the above remarks, as to the importance of worms as a cause of disease, I make the following quotations. Dr. Rush (*Med. Inquiries and Observations*, vol. i, p. 205), remarks: "When we consider how universally worms are found in all young animals, and how frequently they exist in the human body, without producing disease of any kind, it is natural to conclude, that they serve some useful and necessary purposes in the animal economy." M. Guersant says (*Dict. de Méd.* t. xxx, 669): "It has always been the custom to assign to entozoa much too important an influence upon the diseases of childhood. In proportion as this part of pathology is perfected, it becomes evident that the greater number of children dying after having discharged worms, or even while having them still, are affected with acute or chronic diseases, which leave after death incontestable traces of their effects, and which are of themselves necessarily fatal." M. Barrier (*Mal. de l'Enf.* t. ii, p. 100) quotes M. Trousseau as making the following remarks. "For sixteen years we have not met with a single child who has presented any verminous symptoms; never or almost never does a child born and reared in Paris discharge worms, while just the contrary is true as to the provinces. . . . . Young children, to be sure, are sometimes met with in our hospitals, who discharge worms, but they are those who have been born in the country, and have lived in the capital only for a short time." Dr. Condie (*Dis. of Child.* 2d ed. p. 226), remarks: "Worms are a very common occurrence in the intestines of children, and may unquestionably, under certain circumstances, become a cause of severe irritation;—but much less frequently than is generally supposed."

I believe we may conclude, therefore, that though these parasites are of very common occurrence, and productive of grave disorders in some countries, they are rarely met with in quantities sufficient to do serious injury to the health, in other places, as for instance, Paris, and probably in this country, or at least in the northern parts of it.

That intestinal worms do, however, not unfrequently in some countries, and occasionally in all, produce dangerous and even fatal disturbances of the health, cannot be doubted after careful perusal of the evidence brought forward by different authorities. M. Guersant, amongst others, remarks (*Loc. cit.* p. 670): "It is nevertheless incontestable, that the development of these animals in the gastro-intestinal and abdominal cavities, does sometimes give rise to very varied morbid phenomena, which are in some instances grave enough to cause death." Nevertheless, I am disposed to believe, as stated above, that fatal, or even dangerous results from the existence of these parasites, are of rare occurrence in this city, and probably throughout our Northern States. Dr. Dewees, however, mentions several cases in which they produced alarming symptoms, and one in particular (*Dis. of Child.* p. 492), in which the subject, a child twenty months old, was extremely emaciated, and whose abdomen was "enormously distended, and semi-transparent," who recovered rapidly after ninety-six lumbricoides, from six to ten inches long each, had been expelled under the use of pinkroot in infusion.

ARTICLE I.

ASCARIS LUMBRICOIDES.

THE *description* of this worm has already been given at page 697.

CAUSES.—Under this head I shall not pretend to consider the question of the origin of worms, but only the causes which predispose to their production, or favor their growth.

Age has no doubt a considerable influence upon the predisposition to lumbricoides. According to M. Guersant (*Loc. cit.* p. 685), infants at the breast under six months of age are very rarely affected with them. Instances occasionally occur, but are altogether exceptions to the general rule. Above six months of age, they begin to be met with, but still very rarely, so that scarcely one or two will be found in several hundred children of a very early age; while from three to ten years of age they will be observed in about a twentieth, or in some seasons perhaps in a larger proportion. M. Valleix states that he has never met with them in new-born children. Dr. Dewees says (*Loc. cit.* p. 481), that he has never seen worms in children under ten months old; and in only two instances at that age. I do not recollect myself ever to have seen them in subjects younger than eighteen months, and very rarely in those under three or four years.

There can be little doubt that the disposition to worms is *hereditary* in some families. It is generally believed that the species under consideration is more common in *girls* than *boys;* that it is most common in children of *lymphatic* and *scrofulous* constitutions; and that a too exclusively vegetable or milk *diet*, and an abuse of *fruits*, strongly predispose to their production. The *habitation* of a cold and damp, or warm and damp climate, and the *seasons* of summer and autumn, are supposed by many also to favor their production and growth. It is a general belief, and I should suppose from personal experience, a well-founded one, that a feeble and disordered state of the digestive function from any cause, often acts as a predisposing cause of worms, and particularly of lumbricoides.

Seats.—The small intestine is, in a very large majority of the cases, the seat of the ascaris lumbricoides. They are met with, however, in other parts of the digestive tube, particularly the stomach and large intestine, and more rarely in the œsophagus or pharynx. In some instances they are found to have migrated to other organs, as to the liver, gall-bladder, and in still rarer cases, they have passed into the peritoneal cavity, bladder, larynx, trachea, bronchia, and even into the nasal passages and frontal sinuses. They have also been met with occasionally in the walls of the abdomen, forming verminous abscesses, whence they have escaped on the opening of the abscess.

The *number* of ascarides is exceedingly variable; there may be only two or three, ten or twenty, or several hundred. When very numerous, they are apt to be rolled or twisted into knots or balls, which have been seen as large as the fist, so as to block up completely the canal of the intestine. In a case cited by Rilliet and Barthez, from M. Daquin, the duodenum was so filled with worms as to be distended and to have acquired a considerably larger size than natural, while at the same time it was hard and elastic. The jejunum, ileum, and cæcum were filled, so that it seemed as though the worms must have been pushed in by force. They were found also, but in smaller quantity, in the colon. Dr. Condie (*Loc. cit.* p. 230) states that he has known one hundred and twenty lumbricoides to be voided in a single day, by a child five years old. It ought, however, to be remarked, that the instances in which such large numbers are met with are altogether exceptional, especially in our Northern States. I have never myself known more than six, eight, or ten to be expelled, within a few days' time, and very generally there has not been more than three, four, or five.

Anatomical Lesions.—When the number of lumbricoides is small, the mucous membrane has been found in a state of perfect health, while, on the contrary, when they were numerous, and especially when collected together into knots, the membrane has presented a fine injection like that which exists in erythematous enteritis; in some very rare instances on record, in which the quantity of worms has been very great, the mucous membrane has been found deeply injected, thickened, granulated, and in a smaller proportion of cases, softened, and even eroded. Not unfrequently the intestine presents all the characters of well-marked enteritis, or entero-colitis, though the number of worms may be very small. In such cases it is reasonable to suppose that the inflammatory affection has been an accidental complication of the verminous disorder.

Much discussion has arisen in regard to the manner in which *perforation* of the intestine as an accompaniment of worms takes place. It is necessary to suppose, in subjects in whom worms are found in the peritoneal cavity, or in abscesses formed in the abdominal parietes, that perforation of the bowel has taken place, and yet in some instances no trace of the opening is left, no inflammation of the serous membrane is met with, nor has there been any escape of the contents of the digestive canal into the abdominal cavity. In others, however, and much the most numerous cases, it it evident from the anatomical appearances, that the perforation has taken place in consequence of previous ulceration of the coats of the bowel, and that the worms have escaped with the other contents of the intestine. It is in regard to the former class, therefore, that discussion has principally taken place; some asserting that the parasite itself makes the opening, by an active process, while others deny the possibility of this occurrence, and maintain a previous ulceration or softening in all cases. Amongst those who advocate the possibility of perforation independent of previous change in the intestinal coats by disease, are MM. Mondière and Charcelay, the former of whom has examined the subject with a great deal of care, quoted by Rilliet and Barthez; Rilliet and Barthez themselves; the authors of the *Biblioth. du Méd. Prat.*, and M. Guersant; while amongst those opposed to this opinion may be cited, MM. Cruveilhier, Barrier, Dr. Arthur Farre, who greatly doubts the possibility of the accident, and Dr. Condie. I confess myself inclined to believe, from facts stated by different authors, and from the history of two cases which occurred to M. Guersant in 1841, at the Children's Hospital of Paris (*Loc. cit.* p. 680), that worms may in some instances cause a perforation independently of previous disease of the coats of the intestine. In one of these, two lumbrici were found engaged in an opening in the appendix vermiformis, half the bodies of the animals being in the appendix, and half in the peritoneal sac; while in the other, an opening of the same kind as in the previous case was found in the appendix, and though the three worms which were found lying in the abdominal cavity, might have escaped through an ulcerated perforation of the colon, it is not the less true that the opening in the appendix presented the same characters exactly as in the first case, in which the animals were, as the author remarks, "taken in the act." In both instances, the perforation of the appendage was at the extremity of that canal, and in the form of a narrow opening of a conical shape; the membranes were smooth, thinned, and the edges of the orifice sloped off from within outwards; no traces of anterior ulceration was perceptible.

In regard to the *verminous abscesses* already referred to, I shall make but few remarks, referring the reader to more extensive treatises for fuller information. These abscesses have been, in very rare instances, met with in the pharynx and nasal passages, but much more frequently they exist in the abdomen. The latter may be of two kinds, *stercoraceous* and *non-stercoraceous*. In the former, the abscess, which forms upon some portion of the walls of the abdomen, gives issue not only to the worm or worms, and pus, but also to fæcal and even alimentary substances, and leaves behind a fistula connecting with the cavity of the intestine, which may cicatrize after a short time, or remain open during life. In the other form of abscess, the opening through the coats of the intestine has been closed immediately after the passage of the worm, so that the abscess gives issue only to the animal and pus, after which it heals up without giving rise to a fistula.

The verminous abscesses are said to be found generally about the inguinal and umbilical regions; to occur most frequently between the ages of seven and fourteen years, and not to be, as a general rule, very dangerous to life.

SYMPTOMS INDICATIVE OF THE PRESENCE OF WORMS.—I believe it is almost universally acknowledged by later writers, that there is no single symptom, nor group of symptoms, other than the expulsion of the worms, and their detection, which indicate with certainty their existence in the digestive tube. This is the expressed opinion, amongst others, of MM. Guersant, Rilliet and Barthez, Barrier, Valleix, and Drs. Eberle and Condie, and it is also the opinion which I have myself been led to form from my experience amongst children.

Another point worthy of remark is, that even though one or several worms may have been expelled, it is not always fair to conclude that the symptoms under which the child labors, are the result of the presence of others of these animals, as there may be no more in the bowels, or they may be so few in number as not to produce injurious effects; while, on the contrary, various disorders of the digestive tube, as chronic indigestion, simple diarrhœa, and inflammatory diseases of the gastro-intestinal mucous membrane, may and do exist simultaneously with, and yet independently, of, the presence of these parasites.

The *symptoms* generally enumerated as indicative of the presence of worms are the following. The child presents various signs of disturbed health. The stomach is more or less deranged, as shown by furred tongue, eructations, variable appetite, which is sometimes diminished, and sometimes increased, thirst, acid or heavy breath, and nausea. The abdomen may be enlarged or retracted, generally the former, and is often more or less hard and painful to the touch; the condition of the bowels varies in different cases, as they are sometimes costive, and sometimes affected with diarrhœa. According to M. Guersant, the stools often contain glairy substances, and are sometimes streaked with blood and of a yellowish-green color; the patient often suffers from colics, which may be either dull or acute, though more generally the latter, and which are generally felt at the umbilical region. Children affected with lumbricoides are said to present a peculiar physiognomy; the face is usually paler than natural, and sometimes has a leaden tint; the eyes are surrounded by bluish rings, and have at the same time a dull and languid expression; the inferior eyelids are often swelled and puffy; the sclerotic coat of the eye assumes a bilious tint; the nostrils are said to be sometimes swelled, and the child complains much of irritation and itching of those parts, and is constantly picking at them with the fingers. In some instances epistaxis takes place. The child is generally pale and thin, indolent and languid, or irritable and unhappy. The sleep is almost always disturbed. This indeed, is, it seems to me, one of the most important signs both of worms and of chronic functional disorders of the stomach and bowels. The nights are almost always restless, the patient either waking often to drink, or waking in fright and alarm from dreams, or else constantly tossing and turning in sleep, moaning, or grinding the teeth.

Other symptoms mentioned by different observers, and by some very much depended upon, are acceleration with irregularity of the pulse, and dilatation, especially unequal dilatation, of the pupils. I might cite also strabismus, and occasionally cough.

In children in whom the number of lumbricoides is very large, the constitution suffers to a dangerous degree. The symptoms above enumerated are very marked, and at the same time the child is very pale or sallow, emaciated, weak, and without appetite; the abdomen is hard and tumid; the nervous symptoms are severe, and some of the symptoms which I shall describe presently, under the head of Disorders occasioned by Worms, are also observed.

It should be remarked, however, again, that all or any of the symptoms just described may exist independently of the presence of worms, the only certain sign of which is their expulsion from the patient.

MORBID EFFECTS OCCASIONED BY WORMS.—MM. Rilliet and Barthez divide the accidents or effects produced by the existence of lumbricoides into two groups: those which result from the mechanical influence of the entozoa, as their accumulation or displacement; and those which appear to be the consequences of a purely sympathetic action on the different systems of the body, and particularly the nervous system.

MECHANICAL EFFECTS.—Under this head are included perforation and hemorrhage of the intestine, enteritis, abscesses, and the symptoms determined by the displacement or migration of the worms into the ductus communis choledochus, liver, or air-passages.

Of perforation and abscesses I have already treated under the head of anatomical lesions. Hemorrhage is a very rare event, but it occurred in one instance cited by MM. Rilliet and Barthez, and Guersant, from M. Charcelay, in consequence of the rupture of an arteriole in a small rounded ulceration in the duodenum, apparently occasioned by the presence of a large number of lumbrici. Enteritis, as an effect of the presence of worms, has also been referred to under the head of the anatomical lesions. In many instances it is no doubt a mere accidental complication, in no way connected with the presence of entozoa; probably this is true of a large majority of the cases. When, however, the number of the parasites is very great, and particularly when they are collected into large or firm knots and bundles, they may, no doubt, occasion, by their mechanical irritation, inflammation, thickening, softening, and even destruction of the mucous tissue, as in cases cited by M. Guersant, from MM. Bretonneau and Charcelay, and in one which occurred to himself. It should be remarked, however, that the cases on record in which ulcerations evidently depended upon the presence of worms, are, so to speak, infinitely few in comparison with those in which no such alteration existed, or in which it was evidently independent of any influence exerted by the worms.

EFFECTS CAUSED BY THE DISPLACEMENT OR MIGRATION OF WORMS.—Lumbricoides have been found, as we have already seen, in the walls of the abdomen, giving rise to abscesses. They have been discovered also in the ductus communis choledochus, in the gall-bladder, hepatic ducts, in the substance of the liver, forming abscesses, and in the pancreatic canal. The symptoms occasioned by the latter class of cases are very obscure. In one instance, M. Guersant supposed that an attack of convulsions depended upon the presence of worms in the common duct.

More numerous examples are on record, in which violent dyspnœa and cough, and fatal asphyxia, have occurred in consequence of the pressure of lumbricoides which had passed into the œsophagus, or from their introduction into the larynx, trachea, or bronchia. The symptoms occasioned by these accidents are a sudden attack of dyspnœa, anxiety, agitation, threatened suffocation, dry, spasmodic cough, acute, painful cries, pain in the larynx or trachea, and unless relief be obtained in a few hours, death. This kind of attack may depend on the rising of a worm or bundle of worms into the œsophagus, causing pressure on the larynx and trachea, as in the case reported by M. Tonnellé, in which the symptoms disappeared after the expulsion of a large number of worms. I met with an instance of this kind myself. It occurred in a boy fifteen years old, presenting every mark of strong and vigorous health, but who, for three or four weeks before I was consulted in regard to him, had been subject to sudden and apparently causeless attacks of suffocation, which seized him without the least warning. When the attack came on, he would for some instants cease to breathe, or breathe with much difficulty. He always seemed to suffer from the greatest anxiety; the countenance became altered and distressed; he was unable to speak, but made signs for water, and when able to swallow a mouthful, which was always exceedingly difficult, was at once relieved. His mother told me that he always appeared to be in the greatest distress, so that on several occasions, she feared for his life. Striking him violently on the back, which she, when present, always did, sometimes relieved him, but generally the difficulty continued until he could swallow a little fluid of some kind. These attacks were unattended at the time by cough, nor was there the least sign of disorder of the respiratory system in the intervals between them. Suspecting that the difficulty must depend on the rising of a worm or worms into the œsophagus, or upon sympathetic irritation from the presence of these parasites in the stomach, and learning that he had been troubled with worms some years previously, I gave him wormseed oil, which caused the expulsion of a few large lumbricoides, after which he had no return of the symptoms.

The attacks of dyspnœa may depend also, as already stated, on the introduction of worms into the air-passages. Under these circumstances death is very apt to be the result. In one instance, however, reported by M. Arronsshon, after the difficulty had lasted two hours, the patient, a little girl eight years old, after violent efforts at coughing, threw up a living lumbricus.

We have next to consider the *sympathetic effects*, and particularly the *nervous symptoms*, occasioned by worms. We may include amongst the nervous symptoms produced by worms the headache, languor, irritability, restless and disturbed sleep, and grinding of the teeth, so frequently observed. These, however, are of but slight importance in comparison with certain other disorders of the nervous system, which do undoubtedly occur sometimes, though I should suppose *very rarely*, in proportion to the whole number of subjects affected with the parasites. The disorders to which I allude are partial or general convulsions, chorea, hysteria, catalepsy, and epilepsy, which are the most frequent, though, as so often stated already, extremely rare in comparison with the number of cases in which the presence of the worms produces no such effects. Other disorders cited by the authors of the *Bib. du Méd. Prat.*, with cases to prove their reality, are insanity, paralysis, coma, palpitations, strabismus, cough, hyperæsthesia of the skin, amaurosis, and aphonia.

Diagnosis.—It has already been stated that there are no certain signs of the presence of worms in an individual except their expulsion. The symptoms which have seemed to me most strongly to indicate their presence are a chronic disordered state of the digestive apparatus, producing irregular appetite, which is sometimes good and at others bad; slight emaciation; paleness or unhealthy tint of the complexion; languid expression of the face; some irritability of the temper, or a want of the gaiety and activity of disposition natural to childhood; picking at the nose; often some tumidity of the abdomen, which may be at the same time either hard or merely tympanitic; and what seems to me more important than any that I have named, very restless and broken sleep at night, with frequent grinding of the teeth.

M. Valleix remarks that, in a case presenting nervous symptoms simulating disease of the brain, we may suspect the existence of worms, if we learn upon inquiry that symptoms of marked intestinal disorder, the various signs cited above as indicative of the presence of worms, and different derangements of digestion, had preceded for some time the appearance of the nervous symptoms; chiefly for the reason that in most diseases of the brain, the digestive tube is, at the invasion, in a state of integrity, with the exception of sympathetic vomiting. If we can learn, upon inquiry, that the child has discharged worms on some previous occasion, the probability of the dependence of the symptoms upon them becomes still stronger.

It is sometimes difficult to determine positively whether certain substances discharged at stool are fragments of worms, or whether they are portions of imperfectly digested aliment, or foreign bodies. The things which most resemble lumbricoides, are the remains of tendons, ligaments, vessels, fibres of plants, etc. To make the distinction with certainty, the doubtful substance ought to be placed in water, so that it may be thoroughly cleansed, after which it must be carefully examined as to its structure, arrangement, consistence, etc., with the eye, and with the microscope, if necessary. M. Guersant has suggested a very easy method of ascertaining whether the substance be animal or vegetable, which is to subject it to heat, after it has been carefully washed, when the odor will at once inform us of its real nature.

PROGNOSIS.—It is no doubt a very rare event, at least in the northern parts of our country, for life to be endangered by the presence of worms. I have never, myself, met with an instance in which the general health was more than moderately disturbed by this cause. That verminous affections are sometimes, however, dangerous to life in this city, is shown by three cases related by Dr. Dewees, in which very severe and threatening symptoms were instantly relieved upon the expulsion of lumbrici after the exhibition of vermifuges.

Worms become dangerous to life when they migrate from their original seat to neighboring and important organs, particularly the air-passages and liver. The prognosis is unfavorable also when they accumulate in very large numbers, and give rise to the different nervous symptoms above described.

TREATMENT.—Before commencing my remarks upon the particular remedies employed for the destruction and expulsion of worms from the alimentary canal, I would call the attention of the reader to the fact that most of the recognized anthelmintics are more or less irritating to the gastro-intestinal mucous membrane, and some of them to the nervous system also, producing in over doses, severe and even dangerous nervous symptoms. It is evident, therefore, that remedies of this class ought not to be exhibited unless they are manifestly called for, and not at all when symptoms of severe gastro-intestinal irritation, and particularly of inflammation, are present, unless there be the very strongest reasons for supposing that those symptoms depend upon accumulations of worms. I am quite sure that I have, in a considerable number of instances, met with children whose digestive organs had been injured, and in whom slight functional derangement had been converted into severe indigestion, and even inflammatory disorder, by the too frequent or long-continued use, or the administration in excessive quantities, of different vermifuges, and of various quack nostrums, which are sold to an amazing extent in this city, and all over the country.

As the diagnosis of worms is always doubtful, it is best never to risk the administration of any of the irritating vermifuges, unless convinced, by the previous expulsion of worms, that they are almost certainly present; and, indeed, I myself rarely give any other remedy than small quantities of the *wormseed oil* in slight, and especially in doubtful cases, unless this has already been tried and failed. From my own experience I believe that this remedy is all-sufficient in a large majority of the cases that occur in this city, as these are almost always of a mild character, and as it not only produces the expulsion of the parasites when they exist, but also acts beneficially upon the forms of digestive irritation which simulate so closely the symptoms produced by worms. I am persuaded, indeed, that of all the cases that have come under my notice, in which it seemed probable that worms might be present, none were expelled in nearly half, and yet the signs of disturbed health have passed away under the use of the remedy. The oil of wormseed may be given in doses of four drops to children of two years of age, and of six or ten to those above that age, three times a day for three days, to be followed on the morning of the fourth day by a moderately active, but not irritating cathartic dose, the best of which is castor oil or syrup of rhubarb. The objection to the remedy is its nauseous taste and smell; these, however, may be partially disguised by making it into a mixture with yolk of egg, powdered gum, and syrup of ginger. Some children take it very well dropped upon a lump of white sugar, while others take it best mixed with common brown sugar. If one course of the oil, as it is called, fail to relieve the symptoms, another should be administered. It ought to be recollected that when given in large doses, the wormseed oil is irritating to the digestive mucous membrane, and produces dangerous nervous symptoms. I know of one case in which a girl six or seven years of age was made exceedingly ill, and suffered for years afterwards from the effects of a teaspoonful of the oil given by mistake. The following is a very good formula for the administration of this remedy:

℞.—Ol. Chenopodii, ...	gtt. lx vel ʒi.
P. G. Acaciæ, ...	ʒii.
Syrup Simp., ...	℥i.
Aq. Cinnamom., ...	℥ii.—M.

Give a dessertspoonful three times a day, for three days, and repeat after several days.

The wormseed may be given also in powder, in the dose of from twenty to forty grains.

The remedies most frequently employed in this country besides the wormseed, are pink-root or spigelia, oil of turpentine, calomel, and the bristles of cowhage.

I believe that the *pink-root* is more depended upon amongst us than any other single remedy. It is given either in substance or infusion. The dose of the powder is from ten to twenty grains for a child three or four years old, to be repeated every morning and evening for several days, and followed by an active cathartic. The powder is seldom used, however, as the drug is almost always given in infusion. The best and safest mode of administering it is in combination with cathartic substances. Thus, half an ounce each of pink-root and senna may be infused for a few hours in a pint of boiling water, and a tablespoonful given two or three times a day to children two or three years old, for three, four, or five days, when it should be suspended for a time, and resumed, if necessary. A preparation much used in this city under the title of worm tea, and which I have myself given with very good success, consists of the spigelia mixed with senna, manna, and savine, in different proportions, made into an infusion and sweetened with brown sugar. Dr. G. B. Wood (*Pract. of Med.* vol. i, p. 626), recommends the following formula:

℞.—Sennæ, Spigeliæ, ...	āā ℥ss.
Magnesiæ Sulphat., ...	ʒii.
Mannæ, ...	℥i.
Fœniculi, ...	ʒi.
Aquæ fervent., ...	Oj.

These are to be macerated for two hours in a covered vessel, and a tablespoonful given to a child two years old once or twice a day, or every other day, so as to procure two or three evacuations in the twenty-four hours. The remedy is continued for a few days, or for one or two weeks, if necessary, and if it do not debilitate the child.

The *spirits of turpentine* are highly recommended as an efficient remedy for worms by several authorities, and particularly by Dr. Joseph Klapp and Dr. Condie of this city. Dr. Condie states that it is the article from which he has derived the most decidedly beneficial effects, and remarks that it may be given when there exists considerable irritation of the alimentary canal, or even subacute inflammation, without any fear of its increasing either. He gives the rectified spirits in sweetened milk, in molasses, or in the following mixture:

℞.—Mucil. G. Acaciæ, ...	℥ii.
Sacch. alb., ...	ʒx.
Spir. Æther. nitr., ...	ʒiii.

Spir. Terebenth. rec.,	ʒiii.
Magnes. Calcinat.,	℈i.
Aquæ Menthæ,	℥i.—M.

Of this mixture a dessertspoonful is given every three hours.

I have used the spirits of turpentine but once, on account of its extremely disagreeable taste, having up to this time always succeeded perfectly well with the wormseed oil, or with infusion of pink-root with cathartics.

Calomel also is highly thought of by many persons as a vermifuge, and, no doubt, when used in combination with or followed by cathartics, or given in full purgative doses, it is very effectual. I can only repeat what I have already said on several occasions, that it is a remedy which, from the powerful influence it exerts upon the constitution, ought not to be given except when really called for; and, as we can almost always succeed in curing verminous affections by milder drugs, I see no occasion for resorting to this, except in rare cases. When used it is given alone in considerable doses, and followed by some cathartic, or in combination with rhubarb and jalap, or jalap, or scammony.

The bristles or down of *cowhage* are also used by some practitioners, no doubt sometimes with success. I have never used them, and can give no opinion, therefore, from personal experience, as to their efficacy. They are administered by making them into an electuary with honey, syrup, or molasses, a teaspoonful of which is given every morning for three days, and then followed by an active cathartic.

The following *electuary*, recommended by Bremser, is very much employed in Europe, and is highly spoken of by Dr. Eberle:

℞.—Semin. Santonicæ (semen-contra of the French writers), Semin. Tanaceti rude contus.,	āā ℥ss.
Valerian. pulv.,	ʒii.
Jalapæ pulv.,	ʒiss–ii.
Potass. Sulphat.,	ʒiss–ii.
Oxymel. Scillæ,	q. s.—ut. ft.

Electuarium.

A teaspoonful of this is given morning and evening for three or four days, when the dejections generally become more copious and liquid. If it do not produce this effect, Bremser advises that the dose be increased. Dr. Eberle gave it for six or seven days, and says it does far less good when it produces frequent and watery evacuations, than when it causes only three or four consistent stools a day. This preparation has a very disagreeable taste, and children sometimes refuse to take it on that account. When this is the case it may be made into pills.

MM. Rilliet and Barthez recommend the following *syrup*, which was proposed and highly thought of by M. Cruveilhier:

℞.—Follicul. Sennæ, Rhei, Semin. Santonic., Artem. Abrotan.,
Helminthocort., Tanaceti, Artemis. Pontic.,. . . . . āā ʒi.
To be infused in half a pint of cold water, strained, and made into a syrup with sugar, of which a tablespoonful is to be given every morning for three days.

M. Cruveilhier states that this syrup has been very successful in his hands. The *empyreumatic oil* of Chabert is also highly spoken of by some European authorities. It is made by mixing one part of the empyreumatic oil or fetid spirits of hartshorn, with three parts of spirits of turpentine, and allowing them to digest for four days. The mixture is then put into a glass retort, and distilled in a sandbath until three-fourths of the whole have passed over into the receiver. The product should be kept in small and tightly-closed vials. The dose is about fifteen or twenty drops three or four times a day, for children between two and seven years old. This is recommended highly by Bremser and other authorities. The great objection to it is its exceedingly nauseous taste. Dr. Eberle speaks in very favorable terms of a strong decoction of *helminthocorton* or Corsican moss, which he has found "not only valuable as a vermifuge, but particularly so as a corrective of that deranged and debilitated condition of the alimentary canal favoring the production of worms." An ounce of helminthocorton, with a drachm of valerian, are to be boiled in a pint of water down to a gill, and a teaspoonful of the decoction given morning, noon, and evening. It is particularly beneficial in cases attended with the usual symptoms of worms, connected with want of appetite and mucous diarrhœa, and arising from debility of the digestive organs, and a vitiated condition of the intestinal secretions.

In all cases of deranged health supposed, either from the nature of the symptoms, or proved by the previous expulsion of worms, to depend on the presence of these animals in the alimentary canal, it is exceedingly important to attend to the *hygienic treatment* of the child, and in some instances to administer *tonics* and *stimulants*. In not a few cases that have come under my own notice, in which many of the symptoms supposed to indicate the presence of worms have been extremely well marked, I have succeeded in removing them all without a resort to any vermifuge, by the treatment proper for the chronic indigestion or dyspepsia of children. The method of treatment to be employed in such cases has already been laid down in the article on indigestion, to which the reader is referred for full information. It should consist chiefly in strict attention to exercise and diet, and in the use of tonics, as quinine and iron, and small quantities of fine port wine.

Whenever any complication exists in connection with worms, the treatment must be modified according to the nature of the complication. If it consist in inflammation of any part of the digestive tube, the inflammation ought to be attended to first, and the verminous disorder for the time neglected. If the inflammation be very slight, or, if the symptoms indicate only severe irritation rather than positive inflammatory action, we may exhibit the milder and least injurious vermifuges, as very small doses of wormseed oil, which I have never known to do harm, the decoction of helminthocorton and valerian, recommended by Dr. Eberle, or, according to Dr. Condie, the spirits of turpentine. If the verminous affection coexist with any of the acute local inflammations of the thorax, the former ought to be, as a general rule, neglected, until the latter has been relieved by appropriate treatment. In doubtful cases, in which it is impossible to ascertain with certainty whether the symptoms depend on worms, or upon a simple dyspeptic condition of the digestive organs, it is most prudent to give only the simplest and least irritating vermifuges, to regulate the hygienic conditions of the patient, and afterwards to resort to tonics, if necessary.

Various writers, and particularly M. Guersant, advise that we should forbid, in verminous cases, the use of relaxing food, especially of milk preparations, fruits, and of fatty and farinaceous substances; and that, after the expulsion of the worms, we should direct a tonic and strengthening regimen. The diet should consist of boiled and roasted meats, of wine, and of bitters. The author just quoted, states that a change of food alone will often suffice to procure the expulsion of worms. He says (*Dict. de Méd.* t. xxx, p. 689), "I have met with children who had been tormented with ascarides lumbricoides while residing in the country and living upon milk and fruits, and who, upon being brought to the city, and put upon the use of broths and soups, passed considerable quantities of worms, and after that got entirely rid of them."

ARTICLE II.

ASCARIS VERMICULARIS.

THE *description* of this worm has already been given at page 698.

SEAT.—The ascaris vermicularis is found almost exclusively in the large intestine, and in a large majority of the cases is confined to the rectum. It is said to have been found in the vagina in the female, having no doubt passed from the rectum into that canal.

The *causes* which determine the presence of this worm are not at all understood.

SYMPTOMS.—The characteristic, and often the only symptom indicative of their presence, is violent itching about the anus, which is sometimes almost insupportable, and which is generally most troublesome and most apt to occur at night when the child is in bed. In some instances they give rise to acute and violent pain in the region of the anus, and sometimes to tenesmus and mucous or bloody stools. When the last-named severe symptoms exist, the worms may occasion dangerous nervous disorders, and even give rise to general convulsions. The worms not unfrequently escape from the rectum and are found upon the bedclothes, or upon the clothes which the child has worn through the day. Sometimes they are discharged in considerable numbers, and are found in that case, either mixed with the fæces, or with mucus, or collected into balls or knots.

The *diagnosis* of the seat-worm, like that of the lumbricoides, cannot be regarded as positive, unless some have been expelled, or unless they can be seen by examination of the rectum. This can generally be done when they are present in any number, by pressing the nates apart so as to open the anus and bring the folds of the mucous coat of the bowel into view. The only other symptom which indicates their presence with any certainty, is the existence of severe itching about the anus, not to be explained upon any more reasonable supposition.

PROGNOSIS.—These worms do not, as a general rule, produce the same disturbances of the general health as lumbricoides, and in not a few instances are entirely innocuous, with the exception of the pain and inconvenience they occasion.

They are, however, exceedingly troublesome, because of the difficulty of removing them entirely by any treatment. No matter how many are discharged, some almost always remain concealed in the folds of the mucous membrane, and as they are propagated with great rapidity, the same train of symptoms is very apt to return soon after they may have been seemingly dislodged.

TREATMENT.—It has been found by long experience that the common vermifuges given by the mouth, exert much less influence in causing the expulsion of these worms than of the lumbricoides. For this reason enemata are generally resorted to in the treatment, instead of remedies given per orem. Dr. Dewees, however, recommends the elixir proprietatis (tinct. aloes et myrrhæ), in small and often-repeated doses, continued for some time, and followed by enemata of lime-water, camphor, or aloes. He gave twenty drops of the elixir three times a day, in a little sweetened milk, to children from two to four years old, and thirty drops to those between five and seven years.

The plan I have generally resorted to has been to give small doses of the wormseed oil, as directed in the article on lumbricoides, and to direct an injection of from four to six grains of powdered aloes, suspended in a gill of warm milk, for children four years old, to be repeated once in three, four, or five days, according to the necessity of the case.

Lime-water by injection is recommended by several different authorities.

It may be given of its ordinary strength, or mixed with an equal quantity of warm milk, or flaxseed mucilage. Other enemata recommended are spirits of turpentine in milk, a teaspoonful of the former to a gill of the latter; decoction of helminthocorton; an injection made by infusing two drachms of fresh garlic-cloves in three ounces and a half of boiling water, and adding to the infusion, after it has been poured off, a scruple of assafœtida rubbed up with the yolk of an egg; a solution of from six to twelve grains of sulphuret of potassium in half a pint of water; injections of sweet oil, or of lard beaten up with water until it becomes fluid, and even of cold water. The three last-mentioned substances have the advantage of calming the itching and irritation of the rectum almost immediately. Again, it has been recommended to pass a bougie smeared with mercurial ointment into the rectum. I should much prefer a method of using this ointment which succeeded in the hands of M. Cruveilhier in a very severe case. This was to place a little of the ointment on the anus, by which course the patient was entirely relieved after a few days. M. Valleix states that he has obtained the same results by causing the anus to be anointed with the following preparation, a small quantity of which was introduced at the same time into the inferior extremity of the intestine:

℞.—Hydrarg. Chlor. Mitis, ... ℈iv.
Axung., ... ℥vi.—M.

Dr. Wood states that a dose of sulphur taken every morning before breakfast has been found very useful.

The *diet* and *general health* ought always to be strictly inquired after, and attended to by the physician. For information upon these points the reader is referred to the remarks upon hygienic treatment in the last article.

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